

QPRC



**QUEANBEYAN-PALERANG
REGIONAL COUNCIL**

**DEVELOPMENT DESIGN
SPECIFICATION**

D3

STRUCTURES / BRIDGE DESIGN

VERSION 1 – DECEMBER 2018

Amendment Record for this Specification Part

This Specification is Council's edition of the AUS-SPEC generic specification part and includes Council's primary amendments for development at Googong

Details are provided below outlining the clauses amended from the Council edition of this AUS-SPEC Specification Part. The clause numbering and context of each clause are preserved. New clauses are added towards the rear of the specification part as special requirements clauses. Project specific additional script is shown in the specification as italic font.

The amendment code indicated below is 'A' for additional script 'M' for modification to script and 'O' for omission of script. An additional code 'P' is included when the amendment is project specific.

Amendment Sequence No.	Key Topic addressed in amendment	Clause No.	Amendment Code	Author Initials	Amendment Date
VERSION 1	Requirement for fencing of dams clarified	D3.08	A	KRD	14/04/10
	References updated	D3.04	A	HS / KRD	
	Deemed to Comply removed.	D3,11	A		
	Innovative design added	D3.11	A	CS	6/12/18
	Geotechnical Requirements	D3.03.3	A	CS	6/12/18

APPROVED FOR USE:



**PROGRAM COORDINATOR
SUBDIVISION
6/12/ 2018**

DEVELOPMENT DESIGN SPECIFICATION D3

STRUCTURES/BRIDGE DESIGN – VERSION 1

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**DEVELOPMENT DESIGN SPECIFICATION D3
STRUCTURES/BRIDGE DESIGN – VERSION 1****GENERAL****D3.01 SCOPE**

1. This section sets out design considerations to be adopted in the design of structural engineering elements for development at Googong. Such activities will include:

- Road traffic bridges
- Pedestrian bridges
- Structures other than bridges, but associated with roads (eg major culverts, retaining walls, major sign support structures)
- Small earth dams, detention basins
- Structures used for public safety (road safety barriers, pedestrian safety rails, street lighting)
- Temporary works

Such structures may be of concrete, timber or steel constructions, but with emphasis placed on low maintenance.

D3.02 OBJECTIVE

1. The aim of design shall be the achievement of acceptable probabilities that the structure being designed will not become unfit for use during its design life, having regard to economic, physical, aesthetic and other relevant constraints.

Design Life

D3.03 BASIS OF DESIGN

1. The design shall be based on scientific theories, experimental data and experience, interpreted statistically as far as possible. The safety and service performance of a structure depends also on the quality control exercised in fabrication, supervision on site, the control of unavoidable imperfections and the qualifications, experience and skill of all personnel involved. Adequate attention shall therefore be given to these factors. In addition, adequate management control and supervision by experienced engineers shall be required at all stages of design and construction to prevent the occurrence of gross errors.

***Safety Quality
Qualifications***

2. Specifications shall be notated on the Drawings with sufficient detail to ensure that the above described strategies are able to be effectively implemented at the construction stage.

3. Bridge design submitted to Council shall be accompanied by a Geotechnical Investigation & Design Report with site specific requirements addressed in accordance with AS5100.

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D3.04 REFERENCE AND SOURCE DOCUMENTS

(a) Council Specifications

- D1 - Geometric Road Design – QPRC – Version 1
- D5 - Stormwater Drainage Design – QPRC – Version 1
- D7 - Erosion Control and Stormwater Management – QPRC – Version 1

(b) Australian Standards

- AS1158 - The lighting of urban roads and other public thoroughfares (SAA Public Lighting Code)
- AS 1428 Design for access and mobility
- AS 1428.1-2001 General requirements for access—New building work
- AS1170 - Minimum design loads on structures (SAA Loading Code)
- AS1684 - National Timber Framing Code
- AS/NZS 2041-1998 Buried corrugated metal structures
- AS3600 - Concrete structures
- AS3700 - Masonry in buildings (SAA Masonry Code)
- AS/NZS 3845:1999 Road safety barrier systems
- AS4100 - Steel structures
- AS 4678-2002 Earth-retaining structures
- AS 5100 Bridge design Set

Other relevant codes and guidelines with the above.

(c) Other

- AUSTROADS - Guide to Bridge Technology Commonwealth of Australia. Australian Rainfall and Runoff : A Guide to Flood Estimation, 2016
- K D Nelson - Design and Construction of Small Earth Dams (3RD Edition - 2010)

D3.05 ROAD TRAFFIC AND PEDESTRIAN BRIDGES

1. Bridge design shall only be carried out by properly qualified persons whose Consult Australia listing includes structural design of bridges in its claimed area of competency. Such designers shall submit evidence of these qualifications to Council prior to approval of any bridge design.

**Consult
Australia
Listing**

2. However, this does not preclude submissions by other qualified persons in which cases Council reserves the right to call for evidence of the qualifications and experience of the responsible designer; or to seek referral of the design calculations to an appropriate Consult Australia firm for checking. The latter requirement will be at the Developer’s cost, if directed.

**Design
Checking**

3. The AS5100 Bridge Design Set shall be used for all bridge design.

4. Bridges shall have low maintenance finishes. Adequate precautions shall be taken for protection of the materials used in the bridge design; for example, timber and steel require special consideration. Heavy debris and bed loads may be characteristic of some streams so that large spans with slender piers are encouraged. If overtopping is permitted, pedestrian safety rails and road safety barriers are usually omitted. Flood depth indicators and appropriate signposting will be provided in such cases.

**Finishes
Debris,
Overtopping**

5. Preventative maintenance is a key issue affecting the design life of the structure.

Design Life

The Drawings shall specify the design life of the structure together with the relevant maintenance programs to be adopted upon which the design life is based. Parameters used in the design shall also be shown on the Drawings. **Maintenance**

6. Hydraulic design of bridges shall be in accordance with the requirements for major structures in the Specification for STORMWATER DRAINAGE DESIGN & GEOMETRIC ROAD DESIGN SPECIFICATIONS. **Hydraulic Design**

7. Where structures are designed to be inundated, the effect of the backwater gradient on upstream property shall be identified on the Drawings. **Inundation**

8. Where no inundation is permitted, appropriate afflux shall be adopted together with a 500mm freeboard to the underside of the bridge deck. **Freeboard**

9. Designers should enquire regarding current or likely provision for public utilities in bridges. These should be concealed for aesthetic reasons. **Public Utilities**

D3.06 PROVISION FOR PEDESTRIANS ON ROAD BRIDGES

1. Provision for pedestrians on bridges is required in rural residential as well as urban areas. The minimum provision is a 1.5m footpath with kerb at the road traffic edge and pedestrian safety rails at the external edge. **Minimum Provision**

2. Council may require the provision of separate pedestrian footpaths in other situations should the anticipated traffic warrant it. **Separate Footpaths**

3. Disabled access shall be considered in the design. **Disabled Access**

4. Urban bridge approaches should be lit in accordance with AS1158. **Lighting**

D3.07 STRUCTURES OTHER THAN BRIDGES, ASSOCIATED WITH ROADS

1. Public utility structures, major culverts, major sign support structures, retaining walls, and the like will be designed by a competent, practicing engineer, accredited in the design of such structures. The design shall be in accordance with all relevant Australian Standards and the requirements of any utility owners that may be relevant.

D3.08 SMALL EARTH DAMS/DETENTION BASINS

1. Small earth dams shall be designed following the guidelines in "Design and Construction of Small Earth Dams" by K D Nelson together with relevant geotechnical recommendations. The structural design of weir outlets to resist failure shall be considered in design. Refer also to the Retarding Basin and Stormwater Detention sections in the Specification for STORMWATER DRAINAGE DESIGN - VERSION 1

2. Childproof fencing shall be nominated where water depth in the dam/basin will exceed 300mm and side slopes are greater than 1 in 6. **Fencing**

3. The Designer shall carry out the design with recognition of the potential risk on existing and planned infrastructure downstream, assuming the probability of dam/basin failure. **Risk of Failure**

4. The Designer shall be a qualified civil or structural engineer having accreditation in the design of such structures. **Qualification**

5. The Designer shall be required to certify the design and ultimately certify the work-as-executed Drawings for compliance with the design. All relevant details shall be shown on the Drawings. **Certification**

D3.09 STRUCTURES USED FOR PUBLIC SAFETY

1. Since the requirement of road safety barriers and pedestrian safety rails on bridges are different, the design engineer shall consider whether separate traffic and pedestrian barriers can be detailed to satisfy the major functional requirements.
2. The AS5100 Bridge Design Set and AS/NZS 3845 are recommended references in this regard.
3. It is essential that all safety barriers and rails have been fully tested and accredited for the intended use under quality assurance provisions.
4. Bridge crossings in urban and rural residential areas shall be provided with street lighting in accordance with AS 1158. Such requirements will be noted accordingly on the Drawings.

Barriers and Rails

Lighting

D3.10 TEMPORARY WORKS

1. Structures which are proposed for the temporary support of roads, services and the like shall be designed by a qualified Engineer experienced and accredited in the design of such structures and designed in accordance with the AS5100 Bridge Design Set. A construction programme, indicating the sequence of events leading to the implementation and removal of the temporary structures shall be specified on the Drawings.

Programme of Temporary Provisions

SPECIAL REQUIREMENTS

D3.11 INNOVATIVE DESIGN

1. Non standard bridge designs (not in accordance with RMS bridge design manuals) will be assessed by Council on an individual basis. Supporting documentation is to demonstrate the benefits to Council in the use of the “non-standard” design and/or construction practices.

Non Standard Bridge design

D3.12 RESERVED

D3.13 RESERVED

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