Muswellbrook Shire Council

DEVELOPMENT DESIGN SPECIFICATION

AUS-SPEC (Cot 09)

0061 Bridges and other structures

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.

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
0	Customisation for Muswellbrook Council Local Government Area	all	AMOP		24/10/2011

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0061 BRIDGES AND OTHER STRUCTURES

1 SCOPE AND GENERAL

1.1 SCOPE

This worksection sets out design of structural engineering elements for works including:

- Road traffic bridges.
- Pedestrian bridges.
- Structures other than bridges associated with roads (e.g. major culverts, arches, retaining walls, earth retaining structures and major sign support structures, footpath, Kerb and gutter, access).
- Small earth dams and detention basins.
- Structures used for public safety (road safety barriers, pedestrian safety rails, street lighting).
- Temporary works.

Structures may be of concrete, timber or steel constructions. Emphasis is placed on low maintenance.

1.2 OBJECTIVE

The aim of design shall be that the structure remains fit for use during its design life, having regard to economic, physical, aesthetic and other relevant constraints.

1.3 BASIS OF DESIGN

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.

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.

1.4 CROSS REFERENCES

Worksections

Associated worksections: Conform to the following:

- *0074 Stormwater drainage (Design).*

1.5 REFERENCED DOCUMENTS

The following documents are incorporated into this worksection by reference:

Standards

AS 1158-various	Lighting for roads and public spaces
AS 1428	Design for access and mobility
AS 1428.1-2001	General requirements for access—New building work
AS/NZS 2041-1998	Buried corrugated metal structures
AS/NZS 3845-1999	Road safety barrier systems
AS 4678-2002	Earth-retaining structures
AS 5100 - various	Bridge design

Other publications

AUSTROADS

AGBT01-2009 Guide to bridge technology - Introduction and bridge performance
AGBT04-2009 Guide to bridge technology – Design procurement and concept design

AGBT05-2009 Guide to bridge technology – Structural drafting

KD Nelson - Design and construction of small earth dams. Melbourne: Inkata Press, 1985.

1.6 BIBLIOGRAPHY

The following documents provide additional information:

Worksections

0041 *Geometric layout*

0075 *Control of erosion and stormwater management*

Standards

AS/NZS 1170: Various	Structural design actions
AS 3600-2001	Concrete structures
AS 3700-2001	Masonry structures
AS 4100-1998	Steel structures

Other publications

Engineers Australia

Australian Rainfall and Runoff (AR&R)—A guide to flood estimation

1.7 QUALIFICATIONS OF DESIGNERS

Road traffic and pedestrian bridges

Bridge design shall only be carried out by properly qualified persons whose Association of Consulting Engineers Australia (ACEA) 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.

Structures, other than bridges, associated with roads

Public utility structures, major culverts, arches, major sign support structures, retaining walls and earth-retaining structures shall be designed by an Engineer deemed to be suitably experienced in the relevant field by Council and eligible for Chartered Professional Membership of the Institution of Engineers, Australia.

Small earth dams and detention basins

The designer shall be a qualified civil or structural engineer having accreditation in the design of such structures.

Temporary works

The designer shall be a qualified Engineer experienced and accredited in the design of such structures.

Design by other persons

The above requirement does not preclude other persons undertaking bridge or structures design. In which case Council may refer the design calculations to an appropriate ACEA Consultant for checking.

1.8 ROAD TRAFFIC AND PEDESTRIAN BRIDGES

Design

The design of bridges shall comply with AS 5100, AGBT01 and AGBT04.

Structural drafting shall comply with AGBT05.

Design life maintenance

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

Hydraulic design

Hydraulic design of bridges shall be in accordance with the requirements for major structures in 0074 *Stormwater drainage (design).*

Finishes

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

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.

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

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

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

Lighting
Bridge approaches and crossings in urban areas shall be provided with streetlighting in accordance with AS/NZS 1158.

1.9 PROVISION FOR PEDESTRIANS ON ROAD BRIDGES

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

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

Disabled access
Access for the disabled shall be considered in the design in accordance with AS 1428.1.

Structures, other than bridges, associated with roads
The design shall be in accordance with relevant AUSTROADS codes, Australian Standards, and the requirements of any utility owners that may be relevant.

Where applicable, buried corrugated metal structures shall be designed in accordance with AS/NZS 2041 and earth-retaining structures in accordance with AS 4678.

1.10 SMALL EARTH DAMS AND DETENTION BASINS

Design
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 0074 *Stormwater drainage (design)*.

Fencing
Childproof fencing shall be nominated where it is a requirement of relevant statutory regulations, Australian Standards or Council Specifications and where unacceptable risk exists due to the location of the dam/basin in relation to the urban nature of the area.

Risk of failure
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.

Certification
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.

1.11 STRUCTURES USED FOR PUBLIC SAFETY

Barriers and rails
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.

The AS 5100 and AS/NZS 3845 are recommended references in this regard.

It is essential that all safety barriers and rails have been fully tested and accredited for the intended use under quality assurance provisions.

Lighting
Bridge approaches and crossings in urban areas and rural residential areas shall be provided with streetlighting in accordance with AS 1158. Such requirements will be noted accordingly on the Drawings.

1.12 TEMPORARY WORKS

Design
Structures which are proposed for the temporary support of roads, services and the like shall be designed in accordance with the AS 5100.

Construction programs
A construction program, indicating the sequence of events leading to the implementation and removal of the temporary structures shall be specified on the Drawings.

1.13 FOOTPATHS, KERBA AND CHANNEL.

Footpaths, Kerb and channel shall be designed following the council DCP and council's standard drawings

Standard kerb and channel sections

Standard Footpath Drawing

1.14 PROPERTY ACCESS

Council's standard drawing shall be used as a guideline for the design of urban property access and rural property access.

- Standard Drawing Urban property access
- Standard Drawing Rural Property access

1.15 ALL OTHER ROAD STRUCTURES.

All other road structures shall be designed by following relevant RTA standards in the absence of council's specification, instruction and guidelines.