

CAPRICORN MUNICIPAL DEVELOPMENT GUIDELINES

STRUCTURES – BRIDGE DESIGN

D3

DESIGN GUIDELINES

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Keeping the Capricorn Municipal Development Guidelines up-to-date

The Capricorn Municipal Development Guidelines are living documents which reflect progress of municipal works in the Capricorn Region. To maintain a high level of currency that reflects the current municipal environment, all guidelines are periodically reviewed with new editions published and the possibility of some editions to be removed. Between the publishing of these editions, amendments may be issued. It is important that readers assure themselves they are using the current guideline, which should include any amendments which may have been published since the guideline was printed. A guideline will be deemed current at the date of development approval for construction works.

GENERAL

D3.01 SCOPE

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

- Road traffic bridges
- Pedestrian bridges
- Structures other than bridges, but associated with roads (eg retaining walls)
- Small earth dams, detention basins
- Structures used for public safety (traffic barriers, pedestrian barriers, street lighting)
- Major sign support structures
- 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 REFERENCE AND SOURCE DOCUMENTS

(a) Council Specifications

- D1 - Geometric Road Design
- D5 - Stormwater Drainage Design

(b) Australian Standards

- AS1170 - Minimum design loads on structures (SAA Loading Code)
 - AS1684 - National Timber Framing Code
 - AS3600 - Concrete structures
 - AS3700 - Masonry in buildings (SAA Masonry Code)
 - AS4100 - Steel structures
- Other relevant codes and guidelines with the above.

(c) Other

- AUSTROADS - Guide to Bridge Technology
- Inst. of Eng. - Australian Rainfall and Runoff
- Queensland Department of Natural Resources
 - Design of Small Earth Dams Manual
 - Specification for Earth Dams
 - Farm Water Supply Design Manual
 - Queensland Urban Drainage Manual

D3.04 ROAD TRAFFIC BRIDGES

1. Structural design of bridges is a complex matter generally falling outside the scope of many small civil engineering consultancies. Local Government would generally prefer this work to be referred to a firm with experience in the structural design of bridges.

Qualification

2. However, this does not preclude submissions by other qualified persons in which cases Local Government 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 appropriately experienced firm for checking.

Checking

3. The **AUSTROADS Bridge Design Code** is the appropriate general reference for bridge proposals.

4. Local Government's normally requires bridges to have low maintenance finishes, therefore timber and steel are not usually acceptable construction materials, unless suitable precautions are adopted. Heavy debris and bed loads may be characteristic of some streams so that large spans with slender piers are encouraged. If overtopping is permitted, handrails and guardrails are usually omitted. Flood depth indicators will be provided in such cases.

Debris**Overtopping**

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

**Design Life
Maintenance**

6. Unless otherwise indicated on the Development Application, small bridges within the development shall be designed with afflux as determined by The Local Government with certification stating that the bridge is capable of withstanding the inundation loadings for up to the 100 year ARI storm event. If in the opinion of the designer, such certification is impractical, the structure shall be designed to convey the 100 year ARI storm event without inundation.

Small Bridges**Design Storm
Event**

7. Where structures are designed to be inundated, the effect of the backwater gradient on upstream property shall be identified on a plan to be submitted with the design calculations

8. Bridges located in roadways which are to be dedicated as public roads shall be designed to convey the stormwater event identified in the drainage design specification. 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.

Public Utilities**D3.05 PEDESTRIAN 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 handrail. Where a cycleway is planned then a minimum 2.0m width is required.

Pedestrians

2. Local Government may require the provision of separate pedestrian carriageways in other situations should the anticipated traffic warrant it. Urban bridge approaches should be lit. Designers should enquire regarding the current and future utility services which the bridge may be required to carry. These should be concealed for aesthetic reasons. Disabled access shall be considered in the design.

**Carriage of
Utilities**

D3.06 STRUCTURES OTHER THAN BRIDGES, ASSOCIATED WITH ROADS

1. Public utility structures, retaining walls, and the like will be designed by a suitably qualified RPEQ engineer, accredited in the design of such structures. The consultant shall refer to the AUSTROADS code and any other Australian standards to execute the design.

D3.07 SMALL EARTH DAMS/DETENTION BASINS

1. Small earth dams may be designed following the guidelines in the Farm Water Supply Design Manual, Design of Small Earth Dams Manual and the Specifications for Earth Dams 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.

2. Childproof fencing shall be nominated where unacceptable risk exists due to the location of the dam/basin in relation to the urban nature of the area. This requirement shall be determined by Local Government.

Fencing

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

4. The consultant shall be a qualified geotechnical engineer having accreditation in the design of such structures.

Qualification

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

D3.08 STRUCTURES USED FOR PUBLIC SAFETY

1. Since the requirement of traffic 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.

Barriers

2. The AUSTROADS Bridge Design Code is the recommended reference in this regard.

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

4. Urban and rural residential bridge crossings shall be provided with adequate street lighting in accordance with the AS1158 series. Such requirements will be noted accordingly on the design plans.

Lighting**D3.09 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. A construction programme, indicating the sequence of events leading to the implementation and removal of the temporary structures shall be specified on the design plans.

Programme of Temporary Provisions