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

D03.01. SCOPE

D03.01.01. 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 e.g. retaining walls
- 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.

Order of Priority

D03.01.02. The following order of priority for interpretation of documents will apply: (Please note that reference to a Guideline or Standard, is reference to the latest version of the relevant document, unless specifically a version number is specifically stated)

1. CMDG D3 Structures & Bridges Design Specification
2. AUSTROADS Guide to Bridge Technology
3. Australian Standards
4. Queensland Urban Drainage Manual (QUDM)
5. Department of Transport and Main Roads

D03.02. OBJECTIVE

Design Life

D03.02.01. 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.

D03.03. REFERENCE AND SOURCE DOCUMENTS

(a) CMDG Specifications

D1 - Geometric Road Design
D5 - Stormwater Drainage Design

(b) Australian Standards

AS 1158 - Lighting for Roads and Public Spaces
AS 1170 - Minimum design loads on structures (SAA Loading Code)
AS 1428 - Design for Access and Mobility
AS 1657 - Fixed Platforms, Walkways, Stairways and Ladders
AS 1684 - National Timber Framing Code
AS 3600 - Concrete structures
AS 3700 - Masonry in buildings (SAA Masonry Code)
AS 4100 - Steel structures

AS 4678 - Earth-retaining Structures
AS 5100 - Bridge Design Set

Other relevant codes and guidelines with the above.

(c) Others

Department of Transport and Main Roads (DTMR)
- Hydraulic Guidelines for Bridge Design Projects
- Geotechnical Design Standard
- Bridge Design and Assessment Criteria
- Bridge Scour Manual
- Design Criteria for Bridges and Other Structures
- Design Criteria - Marine
- Road Planning and Design Manual (2nd edition)

AUSTROADS
- Guide to Bridge Technology

Engineers Australia
- Australian Rainfall and Runoff

Department of Energy and Water Supply
- Queensland Urban Drainage Manual

D03.04. ROAD TRAFFIC BRIDGES

D03.04.01. Structural design of bridges is a complex matter generally falling outside the scope of many small civil engineering consultancies. Local Government Authorities require this work to be referred to a firm with experience in the structural design of bridges.

Qualification

D03.04.02. Structural designs are to be certified by Registered Professional Engineer of Queensland (RPEQ).

D03.04.03. Certification by an RPEQ 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 qualified firm / personnel for checking.

Checking

D03.04.04. DTMR's Design Criteria for Bridges and Other Structures is the appropriate general reference for bridge design, which complements AS 5100 and calls for some additional requirements.

Reference Document

D03.04.05. AUSTROADS Guide to Bridge Technology shall be resourced as a secondary reference document for informational purposes to provide technical guidance to bridge asset owners.

D03.04.06. Bridges shall be designed to convey the relevant storm event requirements associated with the classification of the roadway in accordance with the Local Government's road hierarchy without inundation.

Design Storm Event

D03.04.07. Bridges shall be designed with afflux as determined by the relevant Local Government with certification on the extent of upstream inundation resulting from the structure.

Afflux

D03.04.08. Drainage structures 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 superstructure.

Freeboard

D03.04.09.	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	***Backwater Assessment***
D03.04.10.	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***
D03.04.11.	Local Government's normally require bridges to have low maintenance finishes; therefore timber and steel are not usually acceptable construction materials, unless suitable precautions are adopted.	***Materials***
D03.04.12.	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***
D03.04.13.	Designers should enquire regarding current or likely provision for public utilities (communications, power, water, etc.) in bridges. These should be concealed for aesthetic reasons.	***Public Utilities***
D03.04.14.	The design life of ancillary elements shall be 50 years.	***Light poles, signage & noise barriers***
D03.04.15.	Refer to CMDG Design Guidelines in the first instance to resolve bridge design matters listed in Appendix A of AS 5100.1 Scope and General Principles.	***Design Considerations***

D03.05. PEDESTRIAN BRIDGES & PROVISION

D03.05.01.	DTMR's Design Criteria for Bridges and Other Structures is the appropriate general reference for pedestrian bridge design, which complements AS 5100 and calls for some additional requirements.	***Requirements***
D03.05.02.	Provision for pedestrians on bridges is required in rural residential as well as urban areas. The desirable minimum provision for the related shared pathway is a clear width of 3.0m with kerb at the road traffic edge and appropriate barriers on both sides of pathway. The minimum width identified in the Road Hierarchy and Path Hierarchy shall be used as a guide.	***Pedestrians and cyclists***
D03.05.03.	Where a dedicated cycle lane on road is planned, a minimum 2.0m width is required. The minimum width identified in the Road Hierarchy and Path Hierarchy shall be used as a guide.	***On Road Cyclists***
D03.05.04.	Local Government may require the provision of separate pedestrian carriageways in situations where the anticipated traffic warrants it.	
D03.05.05.	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.	***Carriage of Utilities***
D03.05.06.	Disabled access shall be included in the design.	***Disabled Access***

D03.06. STRUCTURES OTHER THAN BRIDGES,

D03.06.01. Public utility structures, retaining walls, and the like will be certified by a suitably qualified RPEQ engineer, accredited in the design of such structures. The consultant shall refer to DTMR's Design Criteria for Bridges and Other Structures, which complements AS 5100 and calls for some additional requirements..

D03.07. STRUCTURES USED FOR PUBLIC SAFETY

D03.07.01. The shared barrier between the roadway and pathway is required to address different requirements. The designer shall clearly document all justification for the arrangement of barrier utilised between the roadway and pathway.

Barriers

D03.07.02. Barriers to be designed to DTMR's Road safety barriers, end treatments and other related road safety devices criteria deemed to be accepted for use on state controlled roads in Queensland.

D03.07.03. DTMR's Design Criteria for Bridges and Other Structures is the appropriate general reference for bridge design, which complements AS 5100 and calls for some additional requirements.

Referencing

D03.07.04. DTMR's Road Planning and Design Manual - Part 6: Roadside Design, Safety and Barriers shall be used as a secondary reference document.

D03.07.05. It is essential that all barriers have been fully tested and accredited for the intended use under quality assurance provisions.

Quality Assurance

D03.07.06. 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

D03.08. TEMPORARY WORKS

D03.08.01. Structures which are proposed for the temporary support of roads, services and the like shall be certified 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