DEVELOPMENT DESIGN SPECIFICATION

D3

STRUCTURES BRIDGE DESIGN

DEVELOPMENT DESIGN SPECIFICATION D3
STRUCTURES/BRIDGE DESIGN

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
- Noise barriers and fencing adjacent to public land.

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

D3.02 OBJECTIVE

Design Life

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.

D3.03 BASES OF DESIGN

Safety Quality Qualifications

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.

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

D3.04 REFERENCE AND SOURCE DOCUMENTS

(a) Council Specifications

D1 - Geometric Road Design
D2 - 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
Engineers Australia. - Australian Rainfall and Runoff
KD Nelson - Design and Construction of Small Earth Dams

D3.05 ROAD TRAFFIC BRIDGES

1. Structural design of bridges is a complex matter. ***NPER3***

2. Council will not accept bridge designs from persons who are not qualified as CPEng and registered on NPER.

3. The Austroads Guide to Bridge Technology is the appropriate general reference for bridge proposals.

4. Council 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 shall be designed to withstand the hydraulic and impact forces. Flood depth indicators shall be provided in such cases. ***Debris*** ***Overtopping***

5. 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 in the Notification of Determination of Development Application, small bridges within allotments shall be designed with appropriate afflux to convey the 5 year ARI flood event and be able to withstand the inundation loadings for up to the 100 year ARI flood event. ***Small Bridges*** ***Design Storm Event***

7. Where structures are designed to be inundated, the effect of the backwater gradient on upstream property shall be investigated and clearly shown on the design plans.

8. Bridges located in roadways which are to be dedicated as public roads shall be designed to convey the flood event identified in the Notification of Determination of Development Application. 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 shall consult with service authorities regarding current of likely provision for public utilities in bridges. Written advice from the service authorities shall be submitted with the Construction Certificate application. ***Public Utilities***

D3.06 PEDESTRIAN BRIDGES

1. Provision for pedestrians on bridges is required in rural residential and urban areas. The minimum provision is a 1.5m footpath with kerb at the road traffic edge and ***Pedestrians***

handrail.

2. Council may require the provision of separate pedestrian carriageways in other situations should the anticipated traffic warrant it. Urban bridge approaches shall be lit. Designers should consult with the service authorities regarding the current and future utility services which the bridge may be required to carry. These shall be concealed. Disabled access shall be considered and provided for in the design. ***Carriage of Utilities***

3. Council will not accept bridge designs from persons who are not qualified as Chartered Professional Engineer and registered on NPER.

D3.07 STRUCTURES OTHER THAN BRIDGES, ASSOCIATED WITH ROADS

1. Public utility structures, retaining walls, and the like shall be designed by a Chartered Professional Engineer, competent in the design of such structures. The designer shall refer to the Austroads code and any other Australian standards to execute the design.

D3.08 SMALL EARTH DAMS/DETENTION BASINS

1. Small earth dams may 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.

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 Council. ***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 Chartered Professional 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.

D3.09 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 Guide to Bridge Technology 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. Such requirements will be noted accordingly on the design plans. ***Lighting***

D3.10 TEMPORARY WORKS

1. Structures which are proposed for the temporary support of roads, services and ***Programme of***

the like shall be designed by a qualified Chartered Professional 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.

Temporary Provisions

D3.11 Noise Barriers and Fencing

1. The footings and structural members for noise barriers and fencing adjacent to public land shall be designed to withstand all forces generated by Wind Classification N3.

2. The design of noise barriers and fencing adjacent to public land shall be certified by a Chartered Professional Engineer. The design and certification shall be submitted with the Construction Certificate application.

CONTENTS

CLAUSE **PAGE**