Engineering Design Specification

D08 Bridges and Related Structures

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This document is a modified version of AUS-SPEC 0061 Bridges and Related Structures

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1 General

1.1 Introduction

1.1.1 Worksection application

Description: This worksection is applicable to design and documentation requirements for the following structures:

- Road traffic bridges.
- Pedestrian bridges including bicycle and wheelchair access.
- Structures other than bridges associated with bridge construction e.g. culverts, retaining structures, sign supporting structures and noise barriers.
- Structures providing public safety, e.g. safety barriers, safety rails, protection screens and street lighting poles.
- Temporary works.

1.2 Responsibilities

General: Provide design and documentation for the structures covered by this worksection.

Evidence of designer's qualifications and experience: Submit to Council

Draw attention to any specific requirements of other regulatory bodies, such as but not limited to:
State planning legislation:

- State Environmental Planning Policy (Infrastructure) 2007
- State Environmental Planning Policy No 44—Koala Habitat Protection
- State Environmental Planning Policy (Sydney Drinking Water Catchment) 2011
- Environment Planning and Assessment Act 1979
- Environment Planning and Assessment Regulations 2000
- Fisheries Management Act 1994 plus regulations
- Heritage Act 1977
- Native Title Act 1994
- Fisheries Management Amendment Act 2009 No 114Vegetation Act 2003
- Protection of the Environment Operations Act 1997 plus regulations
- Soil Conservation Act 1938
- Threatened Species Conservation Act 1995
- Water Management Act 2000

Federal legislation:

- Environment Protection and Biodiversity Conservation Act 1999.
- National Parks and Wildlife Act 1974

1.3 Standards

1.3.1 General

Bridge design: To the AS 5100 series and Austroads AGBT series.

2 Pre-design planning

2.1 Planning

2.1.1 Concept design

Design investigations: Inspect the site and carry out necessary design investigations.
Checklists: Complete the following before commencement of detailed design:

- Action checklist for preparation of bridge design concept: To Austroads AGBT04, Appendix B.
- Matters for resolution before design commences: To AS 5100.1 clause 6.

2.1.2 Geotechnical investigation and survey

Requirement: Geotechnical report and survey required. Heritage considerations
Requirement: Provide a plan for management of heritage assets.

2.1.3 Protection of existing infrastructure

Existing plans: Obtain drawings of existing structures adjoining the site.
Dilapidation reports: Carry out inspections of all existing structures adjoining the site. Prepare a report on the existing structural condition including a photographic record of any defects.
Groundwater control: Identify potential effects of dewatering during construction.

2.2 Subsidised schemes

2.2.1 Funding

Government grant funds: If the works form part of a contract attracting Government grant funds, identify items which do not meet the project objectives and the requirements of the various authorities for the least Net Present Value (NPV) but may become the preferred option for construction.
If the works form part of a contract attracting Government grant funds, include the requirements here.

2.3 Consultation

2.3.1 Council and other authorities

Requirements: Consult with the Council and other relevant authorities during the preparation of design. In addition to the requirements of this worksection, identify the specific design requirements of these authorities:

2.3.2 Public consultation

Requirements: Undertake public consultation on design in conformance with Council policy.

2.3.3 Utilities services plans

Existing services: Obtain service plans from all relevant utilities and other organisations whose services exist within the area of the proposed structure. Plot these services on the relevant drawings including the plan and cross-sectional views.

3 Design

3.1 Design criteria

3.1.1 Design life

Requirement: 100 years

3.1.2 Waterways and flood design

Design: To AS 5100.1 Section 11 and Austroads AGBT08.

3.1.3 Geometry

Design: To AS 5100.1 Section 13.

3.1.4 Aesthetics

Design guidance: Austroads AGBT04 Appendix C.

3.1.5 Maintenance considerations

Rehabilitation and strengthening of existing bridges: To AS 5100.8.

3.1.6 Construction considerations

Provisions for traffic: Conform to Traffic management.

3.1.7 Design loads

General: To AS 5100.2.

3.1.8 Serviceability

General: To AS 5100.2.

3.1.9 Environmental constraints

Requirement:
Erosion and sedimentation control: To *D11 Control of erosion and sedimentation (Design)*.

3.2 Road traffic and pedestrian bridges

3.2.1 General

Design guidance: To AS 5100 and AS 1742.
Standard designs:

3.2.2 Design life maintenance

Requirement: Design for low maintenance.
Procedures for planned maintenance: To AS 5100.
Design life maintenance:

- Timber: To AS 5100.9 Section 3.
- Steel: To AS 5100.6 Section 3.
- Concrete: To AS 5100.5 Section 2.

3.2.3 Materials

General: Document low maintenance materials for construction, finishes and fitments. Consider exposure conditions and appropriate durability requirements.
Material types:

- Timber: To AS 5100.9 Section 2.

- Steel: To AS 5100.6 Section 2.
- Concrete: To AS 5100.5 Section.3.

Protection of materials: Document protection methods for materials to satisfy durability requirements.

3.2.4 Drainage

General: Conform to D09 Stormwater drainage (Design).

3.2.5 Freeboard

Design: Provide freeboard to suit local conditions and expected amount and size of debris.
An appropriate afflux shall be calculated and adopted together with 500mm freeboard to the underside of the bridge deck.

3.2.6 Public utilities

General: If public utilities are required, conceal from public view, where possible

3.3 Provisions for pedestrians and cyclists on road bridges

3.3.1 Walkways and cycleways

Standard: To AS 5100.1 clause 13 and Austroads AGRD06A.
Traffic management: AS 1742.9.

3.3.2 Disabled access

Standard: To AS 1428.1 and AS/NZS 1428.4.1.

3.4 Other structures

3.4.1 Buried corrugated metal structures

Standard: To AS/NZS 2041.1 and Austroads AP-T196.

3.4.2 Soil-supporting structures

Standard: To AS 5100.3.

3.4.3 Culverts

Standard: To AS 5100.2 Section 11 and AS 5100.3 clause 9.

3.4.4 Noise barriers

Standard: To AS 5100.1 Section 17 and AS 5100.2 clause 25.

3.5 Structures used for public safety

3.5.1 Barriers and rails

Standard: To AS/NZS 3845.1, AS 5100.1 Appendix A and AS 5100.2 Sections 12, 25 and Appendix A.
Pedestrian and cyclist path barriers: To AS 5100.1 clause 16.

Omitting safety barriers: Conform to AS 5100.1, clause 10.5.2. Specify flood depth indicators and signposting.

3.5.2 Lighting and lighting support structures

Standard: To the AS/NZS 1158 series, AS 1798 and AS 5100.2.
Design: Provide for street lighting on bridge approaches and crossings.

3.5.3 Protection screens

Standard: To AS 5100.1.

4 Documentation

4.1 General

4.1.1 Approvals

Concept plans and Final Certified Plans shall be submitted to Council for approval.
Requirements: Document the approval conditions advised by the appropriate authority which contribute to the basis for the design of the bridge(s) and related structures.

4.1.2 Design reports

Concept design: Provide a design report including the following:

- Design criteria.
- Design options.
- Recommended solution.
- Recommended construction procedures.
- Recommended maintenance procedures.

Detailed design: Provide a design report including the following:

- Design criteria.
- Detailed design calculations.
- Structural design models.
- Reference documents supporting the design, such as hydrological, geotechnical, vibration study and fatigue study reports.
- Construction sequence.
- Maintenance schedule.

4.1.3 Design certification

Requirement: Provide a signed and dated design certificate. Refer D02-Annexure A-Sect 3.1.1

4.1.4 Final certification of completed works

Concept plans and Final Certified Plans shall be submitted to Council for approval.

4.2 Drawings

4.2.1 General

Requirement: Provide drawings and/or computer output defining the works and assumed operating and maintenance procedures.

4.2.2 Structural drafting

Standards: To AS 5100.5 Parts 1 to 9 and Austroads AGBT05

4.2.3 Drawing presentation

Drawing format: *D02 Quality requirements for Design*.

Drawing size: All plans shall be drawn in A1 OR A3 size to comply with AS 1100.101.

4.2.4 Drawing content

Requirement: All drawings to include full bridge structural details, scale, reference of road layout plans, road longitudinal cross section plans, road pavement details, guardrail details, abutment details and scour protection, stormwater drainage details and longitudinal sections and survey set-out details.

4.2.5 Work-as-executed documents

Work-as-executed drawings: Provide an additional set of final construction drawings for the purpose of recording the work completed by the Contractor.

Provide all required data and electronic files as outlined in WSC “Work as Executed plans specification and attribute requirements” located on Council’s website.

Final certification of completed works: The designer shall carry out sufficient site inspection to validate the final certification of the structures.

4.2.6 Verification and approval of construction drawings

Nominate authorised personnel to sign and date as verified and approved each of the final design drawings to certify that the drawings conform with the design calculations. Council requires the professional membership registration details.

5 Annexure

5.1 Annexure - Referenced documents

The following documents are incorporated into this worksection by reference:

AS/NZS 1158		Lighting for roads and public spaces
AS 1428		Design for access and mobility
AS 1428.1	2009	General requirements for access - New building work
AS/NZS 1428.4.1	2009	Means to assist the orientation of people with vision impairment - Tactile ground surface indicators
AS 1742		Manual of uniform traffic control devices
AS 1742.9	2018	Bicycle facilities
AS 1798	2014	Lighting poles and bracket arms - Recommended dimensions
AS/NZS 2041		Buried corrugated metal structures
AS/NZS 2041.1	2011	Design methods
AS/NZS 3845		Road safety barrier systems and devices
AS/NZS 3845.1	2015	Road safety barrier systems
AS 5100		Bridge design
AS 5100.1	2017	Scope and general principles
AS 5100.2	2017	Design loads
AS 5100.3	2017	Foundations and soil supporting structures
AS 5100.5	2017	Concrete
AS 5100.6	2017	Steel and composite construction
AS 5100.8	2017	Rehabilitation and strengthening of existing bridges
AS 5100.9	2017	Timber
Austroads AGBT		Guide to bridge technology
Austroads AGBT04	2018	Design procurement and concept design
Austroads AGBT05	2018	Structural drafting
Austroads AGBT08	2019	Hydraulic design of waterway structures
Austroads AGRD		Guide to road design
Austroads AGRD06A	2017	Paths for walking and cycling
Austroads AP-T196	2011	Guidelines for design, construction, monitoring and rehabilitation of buried corrugated metal structures