0061 BRIDGES AND RELATED STRUCTURES

1. General

1.1. Responsibilities

1.1.1. General

Requirement: Provide design and documentation for the bridges and related structures covered by this worksection.

Full requirements regarding the bridge design shall be confirmed with council prior to any design work commencing. This shall include all design allowances and full scope of works. Designs shall be in accordance with AS5100 following confirmation of performance and loading requirements with council.

Designs shall be undertaken by a suitably qualified and experienced Chartered Professional Engineer who has at least 5 years' experience in bridge design in Australia and designs shall be accompanied by a detailed Design Report and Safety in Design Plan in accordance with WHS legislation.

The designs shall be verified by a suitably qualified and experienced Chartered Professional Engineer who has at least 5 years' experience in bridge design in Australia, who is independent from the team who has completed the bridge design and who was not been involved with any aspect of the design.

Evidence of designer's qualifications and experience shall be submitted to council.

1.1.2. Performance

Factors governing performance shall be confirmed with council prior to any design work commencing and following this confirmation be in accordance with AS5100.

Where necessary, requirements in relation to performance shall be confirmed with state governing authorities.

1.2. Cross References

General

Requirement: This is not a self-contained design document, conform to the following worksection(s):

- 0010 Quality requirements for design;
- 0020 Control of erosion and sedimentation;
- 0041 Geometric road design;
- 0074 Stormwater drainage (Design).

1.3. Standards

General

Bridge design: To the AS 5100 series.

2. Pre-design Planning

2.1. Planning

Detail design requirements shall be obtained from council to enable pre-design 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

Carry out any necessary geotechnical investigation, site investigation and/or test piling to allow confirmation of necessary properties for the bridge design and to confirm any design assumptions. Investigation should be to the extent that subsurface conditions could be reasonably forecast and construction of the bridge could proceed in accordance with design documentation.

2.1.3. Environment and Heritage considerations

A full REF shall be undertaken and completed by suitably qualified persons and which satisfies the requirements of any relevant state and commonwealth legislation. The REF shall identify any environmental and Aboriginal and Non-Aboriginal cultural heritage considerations/items. Any necessary safeguards and mitigation measures identified in the REF shall be allowed for in the design and a plan provided for the management of heritage assets.

2.1.4. 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

Funding

Government grant funds: Confirm with council whether the works form part of a contract attracting Government grant funds and specific requirements resulting from this.

2.3. Consultation

2.3.1. Council and other authorities

Requirements: Consult with the Council and other relevant authorities during the preparation of design.

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. Confirm the location of these services and plot on the relevant drawings including the plan and cross-sectional views.

3. Design

3.1. Design criteria

3.1.1. Design life

100 years.

3.1.2. Waterways and flood design

Design: Generally, in accordance with AS 5100.1 Section 11, however confirm requirements with council prior to commencement of design.

3.1.3. Traffic conditions

Confirm with council prior to commencement of design.

3.1.4. Geometry

Design: Generally, in accordance with AS 5100.1 Section 13, however confirm requirements with council before commencement of design.

Road layout: Conform to 0041 Geometric road design.

3.1.5. Aesthetics

Design guidance: Austroads AGBT04 Appendix C.

3.1.6. Maintenance considerations

Rehabilitation and strengthening of existing bridges: To AS 5100.8.

3.1.7. Construction considerations

Confirm specific construction considerations with council prior to commencement of design.

Specific consideration must be given to traffic control during construction. Traffic control plans shall be prepared by suitably qualified persons following consultation with council and submitted with design plans.

3.1.8. Design loads

General: To AS 5100.2.

Allowance for particular vehicle types shall be confirmed with council prior to the design commencing.

3.1.9. Serviceability

General: To AS 5100.2.

3.1.10. Environmental constraints

Obtain any necessary fisheries/relevant government body permits and allow for any specific requirements of these bodies in the design.

Erosion and sedimentation control: To 0022 Control of erosion and sedimentation.

3.2. Road Traffic and Pedestrian Bridges

3.2.1. General

Design guidance: To AS 5100 and AS 1742.1.

Footpaths, cycleways and shared footpaths: To 0044 Pathways and cycleways.

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 0074 Stormwater drainage (Design).

3.2.5. Freeboard

Design: Provide freeboard to suit local conditions and expected amount and size of debris.

3.2.6. Public utilities

General: If public utilities are required, conceal from public view, where possible. Confirm with council fixing and material requirements before design commences.

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.

Refer 0044 Pathways and Cycleways.

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

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.

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. Work-as-executed drawings

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

4.3. Specifications

Construction documentation

Requirement: Prepare technical specifications using the AUS-SPEC Construction worksection *Templates* from the National Classification System including workgroups 02, 03, 11 and 13.

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 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