

# A3 Roads and Structures Design



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## A3 ROADS AND STRUCTURES DESIGN

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## 3.1 INTRODUCTION

The City of Sydney Streets Technical Specifications have been developed to ensure the provision of high-quality civil infrastructure compatible with the City's maintenance, asset management and serviceability requirements.

These technical specifications are output-based and specify the criteria that must be satisfied for roads and street civil assets owned by the City. Roads and streets infrastructure shall be designed by suitably qualified and experienced professionals and in compliance with these specifications and all relevant legislation, standards and current practice.

This document shall be read in conjunction with Technical Specifications B: Construction and C: Standard Drawings.

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## 3.2 EXCEPTIONS

Departures to the requirements stipulated in the City's Sydney Streets Technical Specifications A: Roads and Street Design, B: Construction and C: Standard Drawings are only permitted with the written approval of the City.

Departures shall be requested in writing. Failure to gain approval prior to construction may result in an order to remove, redesign or reconstruct non-compliant elements.

Written approval shall be required for each instance of non-compliance and shall include a comprehensive explanation of the following:

- description of the proposed departure
- clauses for which departure is sought
- justification when compliance is not possible.

Where the departure is sought during construction, justification as to why the departure was not reasonably foreseeable during the Construction Certificate or detailed design stages is also required.

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## 3.3 CERTIFICATION

Roads and Streets shall be designed by suitably qualified and experienced professionals and certification shall be required stating that the proposed design complies with:

- City's Sydney Streets Technical Specification A3: Roads and Streets Design
- City's Sydney Streets Technical Specification B: Construction
- City's Sydney Streets Technical Specification C: Standard Drawings
- All relevant Standards/Specification/Guide/Standard Drawings that include Austroads Guide to Pavement Technology, RMS Specifications and Standards Drawings.

Certification is required for the design of all elements even where the City's standard drawings are used. The City's standard drawings are to be used for guidance only and the consultant has to verify each of the drawings and details for the project specific requirements (e.g. geometry, loading, subgrade capacity, exposure classification) and amend them as required. At the end, the consultant needs to certify all the details and drawings that will be used in the project.

For flexible pavement design, CIRCLY software is to be used to justify the accuracy of the flexible pavement design. All pavement design considerations and CIRCLY design output are to be certified and submitted to the City.

Similarly for rigid pavement design all design considerations and design calculations are to be certified and submitted to the City. It will need to be justified how all these comply with the requirements of Austroads Guide to Pavement Technology, RMS Specifications and Standards Drawings.

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## 3.4 RELEVANT STANDARDS

Roads and streets shall be designed and constructed in accordance with all relevant standards. This includes the standards listed below; however, it should be noted that the list is not exhaustive. The requirements of these Technical Specifications will prevail where the following standards are in conflict with it:

- Roads and Maritime Services guidebooks
- Austroads Guide to Pavement Technology
- RMS Specifications and Standards Drawings.

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## 3.5 SOFTWARE

CIRCLY software is to be used to justify the accuracy of the flexible pavement design.

For rigid pavement design, relevant software used by the RMS and other NSW organisations (where available) is to be used to justify the accuracy of the design.

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## 3.6 DATA REQUIREMENTS

The following information shall be required with every detailed design or Construction Certificate that includes roads and streets:

- General Plan
- Utilities Investigation Plan
- Relevant City standard drawings
- Certification of Design
- Construction Certification.

### 3.6.1 GENERAL PLAN

A general plan of the proposed works shall be provided at a suitable scale such as 1:200 at A3 and include the following:

- Title block, legend, north point, scale and scale bar
- Property boundaries
- Roads and road names
- Proposed development
- Existing and proposed levels, e.g. road, footpath, other topographical features, etc.
- Relevant topographical features
- Dimensions and/or coordinates accurately identifying the position of all assets without the need to scale positions off plans.

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### 3.7 GENERAL DESIGN PRINCIPLES FOR ROAD DESIGN

Roads should be designed to:

- provide safe, short and fast thoroughfare and access to all road users (motor vehicles, cyclists and pedestrians)
- clearly convey the primary function to road users and encourage appropriate driver behaviour
- deliver traffic volumes at speeds compatible with function
- provide convenient location for services
- provide an opportunity for landscaping
- allow for parking, where appropriate
- have due regard to topography, geology, climate, environment and heritage of the site
- provide low cost of ownership
- comply with these Technical Specifications and relevant Austroads and RMS Guidelines and/or Standards.

The appropriate design criteria for a specific road largely depend on a set of economic indicators: the costs of construction and operation on one side and financial benefits to the community on the other. These are strategic parameters that influence a decision to build a road. Economic analysis, in conjunction with traffic analysis, determine the functional class of the road and the design speed. This section must be read in conjunction with the relevant Austroads and RMS Guidelines and/or Standards.

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### 3.8 GENERAL DESIGN PRINCIPLES FOR STREET DESIGN

A well-designed street requires street design coordination through planning, design detailing and implementation. Composing and considering all elements within the street is a significant contributor to the character and appearance of a place as well as providing a safe and comfortable pedestrian domain.

Good design and layout of elements:

- create a safe street
- reinforce the street hierarchy
- provide required paths of travel and pedestrian priority
- provide a clear and direct composition that reinforces the major design elements
- integrate seamlessly into the paved ground plane
- are located consistently throughout the public domain to reflect the overall special character.

This section must be read in conjunction with the Sydney Street Code.

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### 3.9 BRIDGES AND STRUCTURES DESIGN REQUIREMENTS

Any major structure (e.g. bridge, retaining wall, public stairs/steps/ramps) and inaccessible structures (e.g. box culvert) shall have a 100 year design life and Australian Standard AS5100 is to be used in the design. Further to that appropriate concrete mix (e.g. concrete mix complying with RMS Specification B80) is to be used to ensure a 100 year design life. Australian Standard AS5100.5 is to be used for concrete exposure classification, concrete cover, etc.

- AS5100 - Bridge Design
- RMS QA Spec B80 – Concrete Work for Bridges

Any new bridge and culvert under the road shall be designed for unrestricted vehicular load capacity and shall be capable of supporting all vehicular load of Australian Standard AS5100.2 that include SM1600 and HLP400.

Minor structures are to be designed as per relevant Australian Standards (e.g. AS3600, AS4100). A minimum design life of 50 years shall be achieved in the design unless specified higher by the Council. The Standards to be used include the following:

- AS3600 – Concrete Structures
- AS3735 – Concrete Structures for Retaining Liquids
- AS2870 – Residential Slabs and Footings
- AS2159 – Piling – Design and Installation
- AS4100 – Steel Structures

Steel structures and their surface coatings are to be designed to ensure a minimum of 50 year design life unless specified higher by the Council. Design standards include the following:

- AS4100 – Steel Structures

Shotcrete is to comply with relevant RMS QA Specification (e.g. B82, R68):

- RMS QA Spec B82 – Shotcrete Work  
(For shotcrete work with 100 year design life, e.g. tunnels and retaining walls)
- RMS QA Spec R68 – Shotcrete Work without Steel Fibres  
(For works such as stabilising slopes in conjunction with soil nailing or rock dowelling)

Where stainless steel element is used in council works, the Grade 316 with a minimum of 100 year design life is to be used. Stainless steel items are to be appropriately isolated from carbon steel items where both types of steel are used in the same structure.

Rock bolts to be used in any cliff remediation work shall have a minimum 100 year design life.

For timber works, relevant Australian Standard and RMS Specifications are to be used in the design, construction and surface and preservative treatments. Design report and drawings shall clearly list all these documents to demonstrate how the most appropriate timber grade and timber treatments are used in the design and construction.