



Government of South Australia

Department for Infrastructure
and Transport

Design Report Guideline

Detailed Design Stages

Standards and Guidelines

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Contents

1	Introduction	4
1.1	Purpose of this Guide	4
1.2	Objectives of Design Reports	4
1.3	Level of Detail	4
1.4	Document Management	4
2	Design Report - General	5
2.1	Austrroads Guidance	5
2.2	Report Structure	5
2.3	Report Presentation	5
2.4	Non-Conforming Design Elements	5
2.5	Safety in Design	5
3	Project Background and Objectives	6
3.1	Introduction	6
3.2	Project Background	6
3.3	Design Objectives	6
3.4	Existing Conditions and Constraints	6
3.5	Key Constraints	6
3.6	Planning Studies / Reference Design	6
4	Engineering Elements	7
4.1	General	7
4.2	Design Inputs	7
4.3	Road Design	7
4.4	Road Safety	8
4.5	Traffic Operations	8
4.6	Road Drainage and Stormwater	9
4.7	Geotechnical Design	9
4.8	Pavement Design	10
4.9	Structures	10
4.10	Lighting Design	10
4.11	Land Requirements	10
5	Environment, Heritage and Sustainability	11
5.1	General	11
5.2	Design Inputs	11
5.3	Environment	11
5.4	Aboriginal Heritage	12
5.5	Non-Aboriginal heritage	12
5.6	Sustainability in Design	12
5.7	Landscaping and Urban Design	12
6	Construction and Maintenance	13
6.1	Construction Staging	13
6.2	Utility Services	13
6.3	Temporary Works	13
6.4	Operation / Maintenance of the Works	13
6.5	Processes / Procedures for Commissioning of the Works	13
7	Appendices	14

1 Introduction

1.1 Purpose of this Guide

- 1.1.1 This guideline has been developed to provide assistance to design consultants in the preparation of a design report for new or upgraded roadway.
- 1.1.2 This document is a guideline only, and aims to bring to the attention of the report author the appropriate content that should be included in a design report.
- 1.1.3 This guideline is to be read in conjunction with DIT Master Specification PC-EDM1 Design Management and Master Specification Design Parts.

1.2 Objectives of Design Reports

- 1.2.1 The objective of the design report is to document (and record) the processes, assessments, decisions and outcomes of the design and its compliance to the requirement, including:
 - a) inputs to the design process, such as:
 - i) project requirements;
 - ii) previous planning documents, and references;
 - iii) project constraints and limitations;
 - b) summary of how the design has evolved during the detailed design;
 - c) design basis used in the design development; and
 - d) demonstrate and record compliance to the requirements.
- 1.2.2 Design reports are to communicate succinctly and efficiently to enable efficient review by:
 - a) Departmental technical and project management personnel,
 - b) Independent Design Certifiers (IDC), and external authorities (where required).

1.3 Level of Detail

- 1.3.1 The level of detail included in the Design Reports is to be commensurate with:
 - a) the stage of design (e.g. concept, preliminary, final);
 - b) the complexity, size and location of the project;
 - c) the complexity of project constraints and construction activities;
 - d) the design package size and number of disciplines;
 - e) use of non-standard elements; and
 - f) detail and quality of reference documents.
- 1.3.2 For larger or complex designs a separate design report for each discipline may be necessary.

1.4 Document Management

- 1.4.1 Design reports are to be managed in accordance with the Quality Requirements and Design Management requirements of the Master Specification.
 - 1.4.2 The design report must include important document management information on dates, revisions, and personnel completing the design and design stage etc.
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2 Design Report - General

2.1 Austroads Guidance

2.1.1 The design report structure and content shall align with the requirements in Austroads Guide to Road Design (AGRD) **Part 1- Objectives of Road Design - Section 5.2.**

2.2 Report Structure

2.2.1 The design report shall be structured specific to the project and design elements and to address the following information as appropriate:

- a) Cover page and document information;
- b) Project background and objectives;
- c) Engineering Design;
- d) Environment, Heritage and Sustainability;
- e) Safety in Design;
- f) Construction and Maintenance;
- g) Non-Conforming Design Elements;
- h) Approvals, Quality Assurance (design review) and Independent Design Certification;
- i) Appendices.

2.3 Report Presentation

2.3.1 The design report shall present information in succinct tabular form, as per the example in AGRD Part 1 Table 5.1.

2.4 Non-Conforming Design Elements

2.4.1 Items identified as non-conforming design elements should be listed as follows:

Table 2-1 Extended Design Domain (EDD) / Design Departure (Non-Conforming Elements)

No	Discipline	EDD / Departure Form No.	Brief Description	Status
		Aconex/Teambinder/Knet reference		Issued to DIT/Approved?

2.4.2 EDD and Departure Forms should be attached to the Appendix.

2.5 Safety in Design

2.5.1 Designers shall consider Safety in Design in accordance with the WHS Act 2012 (Code of Practice "Safe Design of Structures").

2.5.2 List any matters that have been addressed during the design and provide a copy of findings in Appendix, if required.

3 Project Background and Objectives

3.1 Introduction

- 3.1.1 A concise statement, detailing a description of the road under consideration, the scope of the design work undertaken, the reason(s) for undertaking the project and what benefits are expected to be achieved as a result of the design.

3.2 Project Background

- 3.2.1 The project background should generally be limited to a single page and consist of the following:
- concise statement defining who commissioned the design project;
 - location of design, including latitude / longitudinal coordinates and road number(s);
 - description of the road(s) under consideration; and
 - scope of the design work undertaken.

3.3 Design Objectives

- 3.3.1 A statement (generally developed as part of planning activities) to clearly define the reason for undertaking the works and the outcome of the design.
- 3.3.2 Where Client's Business Requirements have been completed the design report may be included as an Appendix.

3.4 Existing Conditions and Constraints

- 3.4.1 Brief description of the key existing conditions at the location that will be modified by the proposed design—e.g. *number of lanes, speed limit, access, type of intersection, etc.*

3.5 Key Constraints

- 3.5.1 List any key constraints that have influenced the design solution, including: land acquisition and availability, native vegetation, flora and fauna, heritage, noise and vibration, contamination, accessibility, construction access, temporary traffic, utility services etc.

3.6 Planning Studies / Reference Design

- 3.6.1 List previous concept development reports, planning strategies and studies relevant to the design.
- 3.6.2 List previous preferred concept / tender / reference designs undertaken prior to the commencement of detailed design.
-

4 Engineering Elements

4.1 General

- 4.1.1 This section of the design report is to document and provide discussion on the following design elements that have been considered.
- 4.1.2 The example of elements to be included within this guideline are not exhaustive, and are provided as guidance examples only.

4.2 Design Inputs

- 4.2.1 List any information / requirements stated in design brief or instructions by project manager.
- 4.2.2 Provide information on the survey, its accuracy and integration with utility services information.
- 4.2.3 Where appropriate these can be included as a reference or Appendix.

4.3 Road Design

Design Fundamentals

- 4.3.1 The fundamental elements of the design used as an input into selection of the road design parameters *e.g. location, terrain, road classification etc.*
- 4.3.2 Where a project specific or other State Road Authority design standard is proposed to be adopted in-lieu of a standard recommended in the Departmental guidelines, a detailed explanation on the reasoning and benefit of adopting shall be incorporated.

Geometric Design

- 4.3.3 The geometric road design standards that have been selected for the project and what will be achieved will be documented and typically consist of the following elements as follows.
 - a) cross section elements;
 - b) horizontal alignment;
 - c) vertical alignment; and
 - d) intersection design.
- 4.3.4 Geometric design features are to be presented in tabular form as per the example in AGRD Part 1 Section 5.2 and Table 5.1.

Pedestrian and Cyclist Facilities

- 4.3.5 Discuss the design considerations and outcomes with reference to Public Realm Master Specification Part PR-PF-D1 Designing for Accessibility.
- 4.3.6 Include discussion on the provision of pedestrian and cyclist facilities comprising elements such as:
 - a) "desire lines" for pedestrians and cyclists (origin and destination), including access to bus stops;
 - b) consideration of people with disabilities, (e.g. path gradients, and tactile ground surface indicators);
 - c) consideration of pedestrian mix (e.g. adjacent to school children, / aged car facility or location with potential crowding);
 - d) temporary access requirements to existing pedestrian and cyclist facilities affected by road construction works etc.

Public Transport Provisions

4.3.7 Discuss the requirement and treatment for new and/or relocated bus facilities with reference to the following relevant elements.

Roadside Design, Safety and Barriers

4.3.8 Roadside risk scores should be tabulated as per the example Table 4-4 and discussed in this section with details of any treatments.

Table 4-1 Roadside Design, Safety and Barriers – Example

Element	Requirement	Achieved / Comment / Reference
Roadside risk score		e.g. Austroads Part XX
Oncoming risk score		
Treatment type		
Noise wall interface		

Property Access

4.3.9 Provide discussion on the property access (driveway) provisions as per the following example items:

- the effect on existing property accesses;
- any specific access requirements that need to be or are accommodated for by the design; and
- the treatment for reinstated, relocated and new driveways.

4.4 Road Safety

Road Safety Audit

4.4.1 Any completed Road Safety Audits shall be provided in the Appendices.

4.4.2 A summary of any changes to the design to resulting from the Road Safety Audit should be included.

Safe System Assessment

4.4.3 Provide a summary of Safe System Assessment Scores of the base case and design (where applicable)

4.4.4 A copy of any Safe System Assessments undertaken and a summary of recommendations and responses should be included in the Appendix, where applicable.

4.5 Traffic Operations

Traffic Volumes & Modelling

4.5.1 Refer to Master Specification RD-GM-D4 further guidance on the relevant documentation that is to be submitted with the design report at various stages.

4.5.2 Provide a summary of existing traffic volumes and design volumes.

Traffic Control

4.5.3 Discuss the design considerations for the installation of new signs and/or the modification to existing signs.

4.5.4 Discuss the design considerations for line marking (including road marking) such as removal of existing line marking and new marking.

4.5.5 A traffic impact statements, should be included in the Appendices.

Traffic Signals

- 4.5.6 Refer to Master Specification RD-EL-D2 Clause 2 for guidance on the relevant documentation that is to be submitted with the design report at various stages for traffic signals.
- 4.5.7 The Traffic Signals Operational Performance Report (refer Part RD-EL-D2 Clause 3) is to be provided included within the Appendix.

Intelligent Transport Systems (ITS)

- 4.5.8 Refer to Master Specification RD-ITS-D1 Clause 18.5 for guidance on the relevant documentation that is to be submitted with the design report at various stages for ITS design.

4.6 Road Drainage and Stormwater

- 4.6.1 Refer to Master Specification RD-DK-D1 Clause 16.5 2 on the relevant documentation that is to be submitted with the design report. In addition the design section should include the following elements:
- description of the existing stormwater system, existing flooding issues, asset ownership and condition of stormwater assets;
 - discussion on the proposed stormwater management strategy. This section should include results of stormwater asset condition assessment, culvert blockage assessment, discussion on fauna and fish passage at any new structures and outcomes from the Water Quality Risk Assessment;
 - hydrologic modelling assumptions, methodology and results. This section should also include catchment plan development and the data used to defined catchments;
 - hydraulic modelling assumptions, methodology and results, (including confirmation whether the SA WSUD Policy performance targets have been achieved);
 - stormwater quality modelling assumptions, methodology and results (including confirmation whether the SA WSUD Policy performance targets have been achieved);
 - discussion on erosion control assumptions and methodology.
 - Stormwater Treatment Infrastructure (STI) Proforma to be completed and included in an Appendix,
 - Evidence of Council approval (where applicable).
- 4.6.2 The drainage design standards should be documented in tabular form as per the example in Table 4-6.

Table 4-2 Road Drainage Elements

Element	Requirement	Comment / Reference
longitudinal grades (min and max)		
futter flow widths		
aquaplaning assessment		
pit types and location		
sag points		
etc.		

4.7 Geotechnical Design

- 4.7.1 Refer to Master Specification Part D-EW-D1 Clause 3 and the bridge code for guidance on the relevant documentation that is to be submitted with the design report at various stages for geotechnical elements.
- 4.7.2 Provide references to earthwork design reports, geotechnical data reports and geotechnical interpretive reports (as per AS 1726:2017) where available.

Management of Surface Movement

- 4.7.3 Describe the elements to manage surface movement due to settlement or moisture variation of expansive subgrades.

4.8 Pavement Design

- 4.8.1 For new pavements refer to Master Specification RD-EL-D2 Clause 2 for guidance on the relevant documentation that is to be submitted with the design report.
- 4.8.2 For rehabilitated pavements refer to Master Specification RD-PV-D2, Clause 10.1 for guidance on the relevant documentation that is to be submitted with the design report.
- 4.8.3 Discuss the pavement treatments design with reference to the outcomes of the geotechnical investigations and the following relevant elements from the contracts and DIT Master Specifications;
 - a) pavement design life, traffic raw data with heavy vehicle percentage, and growth rate,
 - b) design CBRs with reference to the geotechnical lab testing report and engineering justifications,
 - c) pavement type assessing with DIT contract documents, design traffic loading, project location and road geometry,
 - d) proposed subgrade treatment in conjunction with earthwork design;
 - e) special treatments, to reduce differential settlement and drainage issue.
- 4.8.4 Discussion should be included on existing pavement composition and subgrade condition as well as consideration of pavement rehabilitation for reuse of remnant pavements.
- 4.8.5 Provide detailed calculations within the Appendix.
- 4.8.6 Include pavement joint details and pavement schedules in pavement drawings.

4.9 Structures

- 4.9.1 Refer to Master Specification Part ST-SD-D1 Clause 19.6 and the bridge code for guidance on the relevant documentation that is to be submitted with the design report at various stages for structural design.
- 4.9.2 Structural calculations are to be provided within the Appendix.

4.10 Lighting Design

- 4.10.1 Refer to Master Specification Part RD-EL-D1 Clause 13.4 and the AS/NZS115 for guidance on the relevant documentation that is to be submitted with the design report at various stages for lighting and electrical design.
- 4.10.2 A copy of lighting sketches are to be provided within the Appendix.

4.11 Land Requirements

- 4.11.1 Where additional land is required to complete the project, list any land acquisition required for the project (include drawings within the Appendix).
 - 4.11.2 Provide discussion on how the land acquisition has been considered within the design development:
 - a) to consider the needs of the project with the impact to the land owners that will be acquired, and
 - b) how the design has been optimised to reduce the land acquisition requirements and negative impact to land owners.
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5 Environment, Heritage and Sustainability

5.1 General

- 5.1.1 This section of the design report is to document and provide discussion on the Environment, Heritage, Sustainability, landscaping elements and how they that have been considered within the design development.
- 5.1.2 The example of elements to be included within this guideline are not exhaustive, and are provided as guidance examples only.
- 5.1.3 Further considerations and guidance is available from the [Environment and Heritage Technical Manual](#).

5.2 Design Inputs

- 5.2.1 Information on previous environmental and heritage investigations, studies and reports that are relevant to the design should be included, as Appendix where relevant.
- 5.2.2 Information provided on the environmental and planning approvals/authorisations obtained or required.
- 5.2.3 Provide an Environment and Heritage Constraints and Values Sketch or Drawing used to inform the design development of the engineering elements.
- 5.2.4 Demonstrate how the design has implemented the considerations/recommendations in the Environmental and Heritage Impact Assessment (EHIA) Report and provide an update or an addendum to the EHIA in the Appendix.

5.3 Environment

Vegetation

- 5.3.1 Reporting requirements for vegetation is provided in Master Specification Part PC-ENV3 and the Environment and Heritage Technical Manual: Attachment 4A – Vegetation Survey Guidelines and Attachment 4B – Vegetation Impact Assessment Guideline.
- 5.3.2 Provide a summary of existing vegetation and a detailed vegetation impact assessment (incorporating design and constructability impacts, consistent with the vegetation survey report appended to the design report), approvals required or obtained and details of the vegetation offset rates and implementation strategy.
- 5.3.3 Discuss the design considerations in applying the mitigation hierarchy to avoid or minimise impacts to individual trees/shrubs and/or areas of vegetation.
- 5.3.4 Provide details of specialist arborist advice obtained to avoid or minimise impacts and how this has been considered/integrated into the design.

Noise Assessment and Treatment

- 5.3.5 Refer to Master Specification PC-ENV4 and the Environment and Heritage Technical Manual: Part 7 - Noise on the relevant documentation that is to be submitted with the design report for Noise assessments and treatments.
- 5.3.6 Provide any necessary information on the Noise Assessment and Treatment design issues or make reference to a separate Noise Modelling and Mitigation Design Report and Façade Treatment Scope of Works document.

Other environmental considerations

- 5.3.7 Assessment and reporting requirements are provided in Master Specification Part PC-ENV3 and Part 1 – Environment and Heritage Impact Assessment and other relevant aspects of the Environment and Heritage Technical Manual.
- 5.3.8 Discussion on the design considerations, assessment and management / mitigation of the following aspects:
- a) fauna (including habitat connectivity);
 - b) air quality;
 - c) vibration;
 - d) water quality;
 - e) contamination and spoil management; and
 - f) groundwater collection and disposal.
- 5.3.9 Include any necessary information on the environmental aspects or make reference to a separate environmental report.

5.4 Aboriginal Heritage

- 5.4.1 Refer to Master Specification PC-H1 on the relevant documentation that is to be submitted with the design report for Aboriginal Heritage.
- 5.4.2 Provide a discussion on the design considerations, assessment and management/mitigation of Aboriginal heritage sites.
- 5.4.3 Identify any if requirements under the Native Title Act may apply to the project, and how these can be avoided, or managed.
- 5.4.4 Include any necessary information on these aspects or make reference to a separate report.

5.5 Non-Aboriginal heritage

- 5.5.1 Identify any non-aboriginal heritage elements within the project extents, and how these can be avoided, or managed.
- 5.5.2 Include information on any SCAP approval required in relation to non-aboriginal heritage.

5.6 Sustainability in Design

- 5.6.1 Reporting requirements are documented in Master Specification PC-ST1 and DIT Sustainability Manual Part 6.
- 5.6.2 The preliminary and final sustainability plan should be included as a reference or an Appendix to the 30% and 100% Design Reports respectively, in accordance with DIT Sustainability manual part 6.
- 5.6.3 Confirm that final design drawings reflect all sustainability initiatives confirmed for implementation.

5.7 Landscaping and Urban Design

- 5.7.1 Refer to Master Specification PR-LS-D1 Clause 13.2(b) on the relevant documentation that is to be submitted with the design report for landscaping and urban design.
- 5.7.2 Information shall be provided on how the landscape design responds to the outputs of the Green Infrastructure assessment, as applicable.
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6 Construction and Maintenance

6.1 Construction Staging

- 6.1.1 Identify the staging considered within the design to enable the works to be constructed whilst meeting any project constraints.
- 6.1.2 For more complex projects this be included as a reference to the construction management plan.

6.2 Utility Services

- 6.2.1 This section will identify services that may be impacted on by the project and potential treatments.
- 6.2.2 The results of the existing services investigation should be tabulated and included in the design report.
- 6.2.3 A copy of the existing services plans and proposed relocation of services plans may be included in the 'Appendices' section of the report.

6.3 Temporary Works

- 6.3.1 Provide information on any temporary works considerations and requirements included in the design development. This may include for example.
 - a) minimum traffic requirements;
 - b) temporary traffic modelling;
 - c) access during construction;
 - d) temporary pavement;
 - e) environment and heritage considerations;
 - f) traffic signage, etc.

6.4 Operation / Maintenance of the Works

- 6.4.1 List any Maintenance in Design assessments / workshops or considerations included within the design.
- 6.4.2 Maintenance regime for design elements (if required)

6.5 Processes / Procedures for Commissioning of the Works

- 6.5.1 Include any items, processes of procedures required for commissioning the works.
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7 Appendices

- 7.1.1 The Appendices will contain relevant information or evidence of the design development.
- 7.1.2 The use of Appendices enable the information to be included without making the body of the report too 'bulky' to effectively communicate to the intended reader.
- 7.1.3 A reference to items included in the Appendices should be included in the body of the report.
- 7.1.4 Typical information to be included as an Appendix or a reference provided may include:
- a) design drawings;
 - b) design verification records;
 - c) evidence of any required environmental or SCAP approvals;
 - d) design to survey compliance check;
 - e) crash data;
 - f) traffic assessment and modelling;
 - g) vehicle turning paths assessments;
 - h) sight distance checks / reports;
 - i) over dimensional route analysis;
 - j) road safety audit findings and safe system assessment findings;
 - k) safety in design records;
 - l) aquaplaning reports;
 - m) structural calculations;
 - n) references to standalone reports or e.g.:
 - geotechnical assessments;
 - environmental and heritage impact assessment report;
 - noise;
 - accessibility (DDA);
 - etc.;
 - o) dial before you dig records;
 - p) Utility services register;
 - q) outline or reference to documentation prepared for the operation / maintenance of the Works;
 - r) processes / procedures for commissioning of the Works;
 - s) etc.
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