

Project Controls

Master Specification

PC-PL3 Concept Design Development

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PC-PL3 Concept Design Development

1 DPTI Standards / Guidelines

- 1.1 Austroads has released the Guide to Road Design (AGRD). All road agencies across Australasia have agreed to adopt the Austroads guides to provide a level of consistency and harmonisation across all jurisdictions.
- 1.2 This agreement means that the new Austroads guides (and the Australian Standards referenced in them) will become the primary technical references for use within South Australia.
- 1.3 This document is issued to clarify, add to, or modify the Austroads Guides.
- 1.4 The following documents provide additional detail of DPTI best practice.
- 1.5 It is necessary to comply with complementary material. These documents can be located <https://www.dpti.sa.gov.au/standards>.

2 General

- 2.1 This Part defines the Requirements for developing Concept Designs.
- 2.2 The Proving Phase and Pre-delivery Phase of a project will typically be the phases during which a Concept Design is developed.
- 2.3 The Requirements for the development and management of detailed designs within the Procurement phase and Delivery phase of a project is detailed in PC-EDM1 “Design Management”.
- 2.4 The Requirements for Constructability Assessments are detailed with PC-PL4 “Constructability Assessment”.
- 2.5 The following definitions apply to terms used in this Part:
 - a) **“Concept Development”** Overall process by which a concept design for an infrastructure project is produced.
 - b) **“Concept Design”** A design completed in sufficient detail to show project options, where key design elements are identified and the project scope is refined.
 - c) **“Preferred Concept Design”** The Concept Design selected from the shortlist of Concept Designs and approved by the Principal as the best holistic solution to achieve the project objectives and outcomes.
 - d) **“Reference Design”** The further development of the Preferred Concept Design, in sufficient detailed to define the project outcomes, requirements, scope and extent of Works. The Reference Design may be utilised as the primary reference in defining the project budget and support the procurement phase for a Design and Construction or Alliance Contract.

3 Concept Design Management Plan

- 3.1 The Contractor shall develop a Concept Design Management Plan to document the Contractor’s approach to manage the development of the Concept Design(s).
- 3.2 The Concept Design Management plan may be integrated with the Planning Study Project Management Plan.
- 3.3 The Concept Design Management Plan shall be commensurate in size and extent with the proposed project and shall include, but not be limited to:
 - a) roles and task of individuals undertaking the Concept Design(s);
 - b) sub-consultants and Contractors; and
 - c) program and deliverables.

4 Concept Design Input Information

- 4.1 The Contractor shall review and assess information to assist in the development of the Concept Designs.
- 4.2 Project information may include those items included in PC-PL2 “Planning Investigations”.

5 Concept Design Development

Framework for development of options and Concept Designs

- 5.1 The framework for development of options, shortlisting of options and development of those options to Concept Designs for a Planning Study is documented in PC-PL1 “Framework for Planning Studies”.
- 5.2 The Contractor shall develop options and Concept Designs to achieve the stated project objectives and outcomes.
- 5.3 The indicative number of options and Concept Designs to be developed shall be as detailed within the Contract Documents and / or agreed with the Principal.
- 5.4 The Concept Design shall be integrated with the outcomes of the Planning Study including:
 - a) PC-PL1 “Framework for Planning Studies”;
 - b) PC-PL2 “Planning Investigations”;
 - c) PC-PL4 “Constructability Assessments”;
 - d) PC-PL5 “Cost Estimation”; and
 - e) PC-PM4 “Risk Management”.

Concept Design Management

- 5.5 Each Concept Design option shall have an individual alphanumeric designation and brief description to enable clear of the option being reviewed.
- 5.6 Designation may be grouped into high level options and further designations for subsequent alternatives (e.g. Option – 2A “Off-line, minimising land acquisition” & Option 2B “Offline, Level of Service D”).
- 5.7 Where the Concept Design proposes a potential Departure or extended design domain (EDD) to a relevant DPTI or Australian Standard requirement, the Contractor (in Consultation with the Principal) shall consult with internal stakeholders to obtain endorsement of the Departure.
- 5.8 The extent of a non-conformance may require a risk assessment to ensure that the outcome is robust to be defended in any litigation that may arise.
- 5.9 Where a pilot or trial project is proposed which present potential higher levels of risk to road users that may not be readily known, a rigorous level of safety assessment shall be undertaken.

Level of Design

- 5.10 Initial options shall be developed to a nominal 5% design to assist the initial assessment and shortlisting for the Proving phase of the Planning Study.
- 5.11 Development of the agreed shortlisted options to Concept Designs shall further refine the design to a nominal 10% design development and consider outputs of investigations as per PC-PL2 “Planning Investigations”.

Preferred Concept Design Development

- 5.12 The preferred Concept Design shall be selected in accordance with PC-PL1 “Framework for Planning Studies” and shall constitute a **Hold Point prior to the development of** a Reference Design.

6 Concept Design Requirements

General

- 6.1 The Concept Design Development of individual disciplines shall be based on the Master Specification Road and Railway Design parts for each individual discipline.

Safety in Design

- 6.2 Safety in Design assessments shall be undertaken throughout the Concept Design development.
- 6.3 The outcomes of the safety in design assessment shall be documented in a Safety in Design report or register within the Concept Design Report.
- 6.4 A road safety “safe systems approach” assessment shall be completed for road projects in accordance with PC-EDM2 “Safety Management in Design”. The safe systems approach assessment may be integrated with the safety in design assessment and road safety audit.
- 6.5 A Preliminary Hazard Analysis integrated in the safety in design assessment shall be undertaken for rail projects.

Transport Modelling

- 6.6 Where specified within the Contractor’s Scope, the Contractor shall undertake transport modelling in accordance with PC-PL2 “Planning Investigations”.

Sustainability

- 6.7 The Contractor shall undertake an assessment of sustainability risks and opportunities for the project to maximise achievement of the sustainability objectives contained in PC-ST1 “Sustainability in Design”.

Utility Services

- 6.8 The development of Concept Designs shall consider and document the impacts on services including but not limited to:
- a) services impacted that require relocation or adjustment;
 - b) feasibility of re-locating services; and
 - c) cost, time and community impact to relocate or adjust services.
- 6.9 Where a major (or potentially major) service has been identified that may result in a major issue with the Concept Design, the Contractor shall develop a concept services re-location to obtain a better understanding of the cost and impact of the service.
- 6.10 The Concept Design shall include a Register of Utility Services impacts including:
- a) list of services potentially impacted by the Works;
 - b) details of the service (e.g. authority, type, size, vertical location, etc.);
 - c) potential impact to the service by the design;
 - d) recommended treatment (e.g. avoid, protection or relocation); and
 - e) details of any consultation with the service authority.
- 6.11 The utility services register shall be provided within the design report and utilised in any Constructability assessment;

Urban Design

- 6.12 The concept design shall align with the DPTI Urban Design principles.

- 6.13 On major projects project specific Urban Design Principles may be developed within the Reference Design to communicate the urban design approach

Land Acquisition

- 6.14 The Concept Designs shall identify any land acquisition requirements to complete the works.
- 6.15 The Land acquisition requirements shall incorporate the outcomes of the constructability assessment including and temporary land requirements for site offices, laydown, services re-location, stormwater management or temporary traffic management.

Stormwater & Groundwater Hydrology & Drainage

- 6.16 The Concept design shall identify the potential impact (or otherwise) on stormwater hydrology (flood flows) and groundwater hydrology (e.g. for an underpass).
- 6.17 Where there is the potential to impact stormwater or groundwater hydrology the Concept design shall assess the potential impact and undertake investigations and modelling commensurate with the risk and level of concept development.
- 6.18 The extent of hydrological investigations and modelling to be undertaken in the concept designs stage shall be confirmed with the Principal.
- 6.19 The Concept Design shall identify and assess the potential impact of the project on water quality and peak discharge rate. The assessment shall consider the project within the context of the larger stormwater drainage network and downstream water quality and flood mitigation infrastructure.
- 6.20 Where appropriate the concept design shall review opportunities both locally within the project extents and within the adjacent drainage network to improvements in stormwater quality.

Environmental Considerations

- 6.21 The concept design shall assess environmental considerations in accordance with PC-ENV3 “Environmental Design” and PC-ENV4 “Noise Assessment, Treatment Design & Implementation”.

7 Development of the Preferred Concept to a Reference Design

- 7.1 Where specified within the Contractor’s scope, the Preferred Concept Design shall be further developed to a nominal 20% Reference Design.
- 7.2 The Reference Design will be of a detail that meets the following requirements:
- individual disciplines within the Reference Design shall be developed in accordance with Table PC-PL3 7-1 **Error! Reference source not found.**;
 - to prepare an accurate project cost estimate in accordance with PC-PL5 “Cost Estimation”;
 - to support the procurement phase of a delivery contract; and
 - a level of detail commensurate with the size, complexity and geometry of the project.

Table PC-PL3 7-1 Nominal Development of Reference Design Disciplines

Discipline	Nominal Development
Road and / or rail geometry	20 %
Transport modelling	70 %
Pavement design	20 %
Utility services, re-locations or protections	20 %
Structural design (e.g. structural form)	10 %
Geotechnical design	20 %
Electrical design	10 %
Drainage	10 %
Stormwater hydrology (flood modelling base case and concept)	70 %
Groundwater (e.g. for tunnel or underpass)	30 %
Environmental elements (e.g. noise, erosion protection, etc.)	10 %

Discipline	Nominal Development
Land acquisition boundaries	20 %
Constructability elements, (e.g. temporary traffic provisions)	20 %
Architectural and landscaping (urban design) elements	10 %
Road safety audit	20 %

- 7.3 The Reference Design shall document agreed Non-compliances or Departures to DPTI, Austroads or Australian Standards.
- 7.4 The Reference Design shall be checked against transport modelling software to confirm the Reference Design is consistent with the defined transport modelling outcomes.

8 Stakeholder Consultation

Engagement with the Principal

- 8.1 Where agreed by the Principal, the Contractor shall support the Project Team in consulting with internal stakeholders to obtain a holistic understanding of the site and key issues.
- 8.2 Internal Stakeholders shall be identified on a project specific basis and may include:
- a) Technical Services, including:
 - i) Principal Road Design Engineer;
 - ii) Principal Structural Design Engineer;
 - iii) Principal Pavement Design Engineer;
 - iv) Principal ITS and / or Electrical Design Engineer(s); and
 - v) Principal Environmental advisor.
 - b) Transport Project Delivery (Project Manager – Delivery);
 - c) Roads and Marine Assets (RAMA);
 - d) Office of Design and Architecture (ODASA);
 - e) Traffic Management Centre;
 - f) Traffic Services;
 - g) South Australian Public Transport Authority;
 - h) Planning and land use services; and
 - i) Emergency Services.

Local Council

- 8.3 Council will be consulted in accordance with PC-PL2 “Planning Investigations”.

Utility Services

- 8.4 Where services have been identified that will (or potentially will) impact the concept designs the Contractor shall coordinate with the Principal to consultation with the service authority.
- 8.5 The Contractor shall reference PC-US1 “Utility Services”.

9 Concept Design Drawings

- 9.1 Concept Design drawings shall be documented on DPTI Sketch title blocks and incorporate state and or Federal Government logos and branding as advised by the Principal.
- 9.2 The development of concept design drawings shall be commensurate with the planning study phase, project size, complexity and risk.
- 9.3 Submission and acceptance of the Concept Design Drawings shall constitute a **Hold Point**.

Project Drawings

- 9.4 Concept Design drawings shall be developed to communicate the project extents and features to people without technical training including notes of features of the concept design.

Technical Drawings

- 9.5 Concept Design technical drawings of the preferred Concept Design (and shortlisted concept designs where specified) shall be developed to support the development of project scope and requirements and accurate project estimates.
- 9.6 The detail of Concept Design drawings shall be commensurate with the stage of concept development (e.g. initial Concept Design, shortlisted Concept Design, and Reference Design of Preferred Concept Design).
- 9.7 Concept Design technical drawings shall including but not limited to:
- a) extent of works, including general layout and typical cross section(s);
 - b) land acquisition requirements;
 - c) utility services, including protection and re-location requirements;
 - d) notes, detailing the key features, risks and constraints:
 - i) for the Principal to consider in developing the option(s); and
 - ii) for the project estimator to consider in the development of the project estimate.
 - e) environmental or heritage constraints or issues; and
 - f) basic cut / fill volumes for construction estimating.
- 9.8 Where the Concept design includes grade changes from existing (e.g. overpass), is in terrain that will required cut or fill, or flat terrain that may result in low points, the shortlisted Concept designs shall incorporate a 3D concept assessment and a 3D digital model (e.g. 12da File).
- 9.9 Technical Drawings shall be provided on DPTI sketch title blocks in PDF format and native electronic files (e.g. dwg, 12da, rvt).

10 Concept Design Report

- 10.1 The Contractor shall develop a Concept Design Report to document the development and background on the development of the Concept Design(s).
- 10.2 The Concept Design report shall be submitted to align with each planning phase submission as detailed in PC-PL2 "Planning Investigations".
- 10.3 The Concept Design report shall be updated through the Planning study. The development of Concept Design report at each phase shall be commensurate with the Planning Study phase, project size, complexity and risk.
- 10.4 Where the Preferred Concept Design is developed to a Reference Design the Concept Design report shall document the concept development commensurate to the risk and complexity of the project and shall as a minimum incorporate the following:
- a) executive summary;
 - b) brief background and development of the Concept Design(s) to the Reference Design;
 - c) non-compliances or Departures to the Master Specification & Standards;
 - d) transport modelling outcomes (e.g. level of service, travel time saving etc.);
 - e) decision register;
 - f) risks register & opportunities;
 - g) utility services register;
 - h) land acquisition requirements or register;

- i) outcomes of the safety in design assessment(s) (e.g. safe systems assessment etc.);
 - j) summary of the constructability assessment incorporation into the concept design; and
 - k) sustainability assessment.
- 10.5 Submission and acceptance of the Concept Design Report at **each** planning phase shall constitute a **Hold Point**.

11 Visual Media

- 11.1 Where specified within the Contractor's scope, visual media representations of the concept design for community consultation or stakeholder engagement shall be developed to communicate the Preferred Concept.
- 11.2 Where requested by the Principal, the Contractor requested shall provide electronic information of the preferred Concept Design to enable third parties to develop visual media of the Preferred Concept design.

12 Hold Points

- 12.1 The following is a summary of Hold Points referenced in this Part:

Document Ref.	Hold Point	Response Time
5.12	Selection of the Preferred Concept	N/A
9.3	Submission and acceptance of the Concept Design Drawings	10 Days
10.5	Submission and acceptance of the Concept Design Report	10 Days