

Project Controls

Master Specification

PC-PL3 Concept Design Development

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1	Initial Issue	28/06/19
2	Formatting and cross referencing changes	15/08/19
3	Green infrastructure, Transport Modelling, inclusion of pedestrian environment for Reference Design and general structure	August 2020
4	Inclusion of green infrastructure in land acquisition considerations and concept design technical drawings and the need to document the design basis	June 2021
5	Change 4.6 to reflect corporate structure	July 2022

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PC-PL3 Concept Design Development

1 Department 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 Contractor shall also comply with complementary material. These documents can be located <https://www.dit.sa.gov.au/standards>.

2 General

- 2.1 This Part specifies 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 is detailed in PC-EDM1 "Design Management".
- 2.4 The following definitions apply to terms used in this Part:

Table PC-PL3 2-1 Definitions

Term	Definition
Concept Development	Overall process by which a concept design for an infrastructure project is produced.
Concept Design	A design completed in sufficient detail to show project options, where key design elements are identified and the project scope is refined.
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.
Reference Design	The further development of the Preferred Concept Design, in sufficient detail 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 Inputs and Requirements

General

- 3.1 Outputs and requirements resulting from those items included in PC-PL2 "Planning Investigations" will be considered by the Contractor in the development of the Concept Designs.
- 3.2 The Concept Design development of individual disciplines will also be based on the Master Specification Project Controls, Roads, Structures, Public Realm, Railway and Marine Design parts for each individual discipline.

Transport Modelling

- 3.3 Where specified within the Contractor's Scope, the Contractor shall undertake transport modelling in accordance with PC-PL2 "Planning Investigations".
- 3.4 Transport modelling outputs shall be included as part of each phase of the relevant Concept Design Report submission including related Hold Points.

Safety in Design

- 3.5 Safety in Design assessments shall be undertaken throughout the Concept Design development.
- 3.6 The outcomes of the safety in design assessment shall be documented in a Safety in Design report or register within the Concept Design Report.
- 3.7 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.
- 3.8 A Preliminary Hazard Analysis integrated in the safety in design assessment shall be undertaken for rail projects.

Urban Design

- 3.9 Where available, the Concept Design development will consider the project Urban Design Framework or Principles and the green infrastructure assessment.

Land Acquisition

- 3.10 The Concept Designs shall identify any land acquisition requirements to complete the works.
- 3.11 The Land acquisition requirements shall incorporate:
 - a) the outcomes of the constructability assessment including any temporary land requirements for site offices, laydown, services re-location, stormwater management or temporary traffic management;
 - b) the outcomes of the green infrastructure assessment, if applicable, including any land requirements to achieve the green infrastructure objectives.

Stormwater and Groundwater

- 3.12 The Concept design shall consider the potential impact (or otherwise) on stormwater hydrology (flood flows) and groundwater hydrology (e.g. for an underpass).
- 3.13 Where there is the potential to impact stormwater or groundwater, the Concept design development will include an assessment of the potential impact including investigations and modelling commensurate with the risk and level of concept development.

4 Concept Design Development

Concept Design Management Plan

- 4.1 The Contractor shall develop a Concept Design Management Plan to document the Contractor’s management of the development of the Concept Design(s).
- 4.2 The Concept Design Management plan may be integrated with the Contractor’s Planning Study Project Management Plan.
- 4.3 The Concept Design Management Plan shall be commensurate in size and extent with the proposed project and shall include, but not be limited to, the following:
 - a) roles and task of individuals undertaking the Concept Design(s);
 - b) the internal and external design review process; and
 - c) management of sub-consultants and Contractors inputs;

Stakeholder Engagement

- 4.4 The Contractor shall consider the outcomes of engagement and consultation undertaken in accordance with PC-PL2 “Planning Investigations” in addition to the engagement outlined below.

- 4.5 Where agreed by the Principal, the Contractor shall support the Project Team in consulting with internal stakeholders to obtain a holistic understanding of the key issues.
- 4.6 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 Services (RMS);
 - d) Office of Design and Architecture (ODASA);
 - e) Network Management Services (NMS);
 - f) South Australian Public Transport Authority;
 - g) Planning and land use services; and
 - h) Emergency Services.

Concept Options and Version Control

- 4.7 Each Concept Design option shall have an individual alphanumeric designation and brief description to enable clear of the option being reviewed.
- 4.8 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”).

Design Departures and EDD

- 4.9 Where the Concept Design proposes a potential Departure or extended design domain (EDD) to a relevant Department or Australian Standard requirement, the Contractor (in Consultation with the Principal) shall consult with internal stakeholders to obtain endorsement of the Departure.
- 4.10 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.
- 4.11 Where a pilot or trial project is proposed which presents potential higher levels of risk to road users that may not be readily known, a rigorous level of safety assessment will be undertaken.

Level of Design

- 4.12 The longlist of options will be developed to a nominal 5% design to assist the initial assessment and shortlisting for the Proving phase of the Planning Study.
- 4.13 Development of the agreed shortlisted options to Concept Designs shall further refine the design to a nominal 10% design development and consider outputs and requirements of investigations as per PC-PL2 “Planning Investigations” as inputs to the design development.
- 4.14 Level of Design for individual disciplines shall be commensurate with the scale, risk and complexity of the proposed project and be documented in the Concept Design Management Plan.

Development of the Preferred Concept to a Reference Design

- 4.15 The preferred Concept Design shall be selected in accordance with PC-PL1 “Framework for Planning Studies”.
- 4.16 Where specified within the Contractor’s scope, the Preferred Concept Design shall be further developed to a nominal 20% Reference Design.

- 4.17 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 4-1;
 - 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 4-1 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 aspects (e.g. vegetation, noise, air, erosion, etc.)	10 %
Land acquisition boundaries	20 %
Constructability elements, (e.g. temporary traffic provisions)	20 %
Pedestrian environment including disability, access and inclusion	10%
Architectural, landscaping and amenity (urban design) elements	10 %
Green infrastructure elements	10 %
Road safety audit	20 %

- 4.18 The Reference Design shall document agreed non-compliances or Departures to Department, Austroads or Australian Standards.
- 4.19 The Reference Design shall be checked against transport modelling software to confirm the Reference Design is consistent with the defined transport modelling outcomes.

5 Concept Design Drawings

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

Project Drawings

- 5.4 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

- 5.5 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.
- 5.6 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).
- 5.7 Concept Design technical drawings shall include, but not be 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 values; vegetation removal;
 - f) type and approximate extent of green infrastructure envisaged across the project, annotated with objectives and desired characteristics (if a Green Infrastructure Assessment has been undertaken); and
 - g) basic cut / fill volumes for construction estimating.
- 5.8 Where the Concept design includes grade changes from existing (e.g. overpass), is in terrain that will require 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).
- 5.9 Technical Drawings shall be provided on Department sketch title blocks in PDF format and native electronic files (e.g. dwg, 12da, rvt).

6 Concept Design and Reference Design Report

- 6.1 The Contractor shall develop a Concept Design Report to document the development and background on the development of the Concept Design(s).
- 6.2 The Concept Design Report shall be submitted to align with each planning phase as detailed in PC-PL1 "Framework for Planning Studies".
- 6.3 The Concept Design Report shall include the Concept Design Basis including key parameters and interpretations of Standards and relevant Master Specification Parts.
- 6.4 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.
- 6.5 Where the Preferred Concept Design is developed to a Reference Design, a Reference Design Report will be prepared that documents 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) the green infrastructure assessment.
- 6.6 Submission of the Concept Design (at **each** planning phase) or the Reference Design Report shall constitute a **Hold Point**.

7 Visual Media

- 7.1 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.
- 7.2 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.

8 Hold Points

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

Table PC-PL3 8-1 Hold Points

Document Ref.	Hold Point	Response Time
5.3	Submission of the Concept Design Drawings	10 Working Days
6.6	Submission of the Concept Design Report / Reference Design Report	10 Working Days