

PART D10
DESIGN REQUIREMENTS - GENERAL

CONTENTS

1. GENERAL
2. DESIGN MANAGEMENT PLAN
3. DIGITAL ENGINEERING EXECUTION PLAN
4. DESIGN PROGRAM AND WORK BREAKDOWN STRUCTURE
5. DESIGN COORDINATION
6. DEVELOPMENT OF THE DESIGN AND DESIGN DOCUMENTS
7. DESIGN VERIFICATION AND VALIDATION
8. DOCUMENT CONTROL
9. THE DESIGN DOCUMENTS
10. DIGITAL ENGINEERING
11. PROVISION OF THE DESIGN DOCUMENTS TO THE PRINCIPAL
12. TRAFFIC CONTROL DRAWINGS
13. INSPECTION AND CERTIFICATION
14. HOLD POINTS

1. GENERAL

- .1 This Part specifies the general requirements for the management of the design process. Refer to Part D11 Engineering and Design Management Railways for additional design management requirements applicable to Railway Infrastructure (if applicable).
- .2 The following documents are referenced in this Part:
 - (a) DPTI: "Technical Standards and Guidelines", in particular:
 - i) Drawing Presentation DP001 General Requirements
 - ii) Asset Information Requirements (Road Projects);
 - (b) DPTI: "Structures Group Drafting Guidelines for Consultants".
 - (c) DPTI: AM4-DOC-000364 "Drafting Standard For AutoCAD drawings"
 - (d) AS 9001
 - (e) Commonwealth Disability Discrimination Act 1992.
 - (f) Disability Standards for Accessible Public Transport 2002
 - (g) Disability (Access to Premises – Buildings) Standards 2010.
- .3 DPTI standards and guidelines are available from http://www.dpti.sa.gov.au/standards_and_https://www.dpti.sa.gov.au/contractor_documents/public_transport_technical_information.

2. DESIGN MANAGEMENT PLAN

- .1 For all design work, the Contractor shall develop, implement and maintain a Design Management Plan which, at a minimum, includes details of, or procedures for:
 - (a) managing all design activities, including:
 - i) management and organisation of design personnel;
 - ii) design reviews;
 - iii) process to generate innovation; and
 - iv) coordination and integration between different design disciplines;
 - (b) roles, skills and competencies of the personnel undertaking design work;
 - (c) roles, skills and competencies of the personnel preparing the construction specification;
 - (d) management of Design Verification;
 - (e) management of the Proof Engineering (where appropriate);
 - (f) management of Road Safety Audits (where appropriate);
 - (g) interface with the Risk Management Plan (refer Part G25 "Risk Management") and preparation of the Safety in Design Report (refer Part D16 "Safety in Design");

- (h) keeping the Principal and any independent verifier informed of the progress of the design, resolution of design issues or major design decisions, including the management of formal communications (such as requests for information (“RFI”) and notification of Hold Points);
 - (i) incorporating the outcomes and recommendations of the design review, Design Verification, Proof Engineering (where appropriate), Road Safety Audits (where appropriate) and recommendations and comments from the Principal and any independent verifier into the design documentation;
 - (j) interfaces with the Design Program and work breakdown structure (“WBS”);
 - (k) management of Design Documents (refer Clause 8 “Document Control”); and
 - (l) identifying and managing Hold Points during design activities.
- .2 The Design Management Plan may alternatively be referred to as the Design Quality Plan. The Design Management Plan is a Controlled Document (refer Part G20 “Quality System Requirements”). Provision of the Design Management Plan, or any proposed amendments to the Design Management Plan shall constitute a **HOLD POINT** (refer to Clause 14 “Hold Points”).
- .3 Further to Clause 8.3.4 “Design and development controls” of AS 9001, records of all design control measures shall be generated by the Contractor’s Quality System.

3. **DIGITAL ENGINEERING EXECUTION PLAN**

- .1 The Contractor shall develop and implement a Digital Engineering Execution Plan (“DEXP”) which complies with DPTI “Asset Information Requirements (Road Projects)”.
- .2 Provision of the DEXP shall constitute a **HOLD POINT** (refer to Clause 14 “Hold Points”).

4. **DESIGN PROGRAM AND WORK BREAKDOWN STRUCTURE**

Program

- .1 The Contractor’s Program shall include a “Design Program”. At a minimum, the Design Program shall provide details of the following:
- (a) design activities, which are correlated with the Contractor’s work breakdown structure (“WBS”) for each discrete element of the Works and the Temporary Work;
 - (b) design coordination meetings;
 - (c) time for the provision (in electronic and hard copy format) of the draft and Final Design Documents specified in the Contract Specific Requirements to the Principal (and any independent verifier and Proof Engineer where relevant) for comment / release of applicable Hold Point;
 - (d) the Designer’s inspection of the Site and the stage of design that the inspection will take place (refer Clause 13.1 “Inspection of Site”);
 - (e) float and the critical path of all design packages;
 - (f) Design Verification and Road Safety Audits (if applicable); and
 - (g) the time allowed for comments from the Principal for the time for the release of Hold Points.
- .2 The Design Program is a Controlled Document (refer Part G20 “Quality System Requirements”). The Contractor shall provide the Principal with a copy of any revised Design Program within 4 days of the revised Design Program being approved by the Contractor for implementation.

Work Breakdown Structure

- .3 The Contractor shall prepare a WBS which identifies the design of individual elements of the Works and the design disciplines associated with each individual element. The WBS shall be commensurate with the complexity of the Works. The WBS is a Controlled Document (refer Part G20 “Quality System Requirements”). If the WBS is revised, the revised WBS shall be provided to the Principal with the revised Design Program.

5. **DESIGN COORDINATION**

Design Coordination Meetings

- .1 The Contractor shall convene design coordination meetings to be held throughout the design phase at intervals not exceeding 2 weeks or whenever requested by the Principal. The design coordination meetings shall review the status and progress of the design and the meeting shall involve, as a minimum, representatives of the Contractor and the Principal.

- .2 The Contractor shall prepare progress reports for presentation at the meeting. These shall summarise:
 - (a) the progress and status of the design, including any modifications to the preceding versions of the Design Documents and Controlled Documents;
 - (b) how any previous comments from the Principal have been addressed;
 - (c) progress against the Design Program and any revisions to the Design Program;
 - (d) discussions and unresolved issues; and
 - (e) report on Design Review, Design Verification and Proof Engineering (where applicable).
- .3 At each meeting, the Contractor shall present an updated Design Program and register of Design Documents (refer Clause 8 "Document Control"). These shall identify:
 - (a) all Design Documents which will be delivered in the forthcoming 28 days; and
 - (b) all Design Documents which are expected to be delivered between weeks 5 and 8 from the date of the design coordination meeting ("Look Ahead Program").
- .4 The Contractor shall record meeting minutes and forward the minutes to all parties not later than 7 days after each meeting. If a party does not accept any aspect of the minutes as being a reasonable record of the meeting, that party shall advise the other parties of the proposed changes required to be made in order to achieve a reasonable record of the meeting.
- .5 The minutes of the meeting are for information only. If, at a design coordination meeting, the parties agree upon an amendment to the Agreement or the Principal issues a direction, these shall be separately documented and clearly identified as such.
- .6 If requested by the Principal, the Contractor shall convene additional meetings and make available relevant Designers and other project personnel to explain the documentation or to report on specific matters which the Principal reasonably requests.

Design Reviews

- .7 The Contractor shall convene and host a review ("Design Stage Review") with the Principal's key personnel at each Design Stage specified by the Principal.
- .8 These reviews are formalised assessments during the development of the design to ensure that deficiencies in regard to design principles and practices and project requirements are identified and corrected. The Contractor shall present the design at the workshop to sufficient detail to verify that it has achieved the design intent. Changes to the design, with particular attention to the integration and interaction of the different design elements, shall also be identified. All necessary documentation (including the Design Reports) shall be provided to the Principal prior to the applicable Design Stage Review.
- .9 The conduct of each Design Stage Review constitutes a **HOLD POINT** (refer to Clause 14 "Hold Points").

Review Comments Register

- .10 The Contractor shall develop and implement procedures to capture, process and close out comments received during the design review processes. These shall be logged on a register of comments and the Contractor shall ensure all comments are successfully closed out.
- .11 The register of comments shall be updated as comments are closed out and submitted at design coordination meetings. The register shall be submitted with the progress reports at each design review.

6. DEVELOPMENT OF THE DESIGN AND DESIGN DOCUMENTS

No Relief from Contractor's Obligations

- .1 The Contractor acknowledges and agrees that:
 - (a) the development of the design to meet the requirements of this Contract is the sole responsibility of the Contractor;
 - (b) except where specified otherwise in this Contract, the Principal has no obligations in respect of the development of the design;
 - (c) receipt of the Contractor's Documents by (or on behalf of) the Principal is solely for the purpose of monitoring the performance and progress of the Contractor;
 - (d) the Principal owes no duty to the Contractor to review or examine any of the Contractor's Documents submitted by the Contractor for compliance with this Contract or any applicable legislation;

- (e) notwithstanding any review, comment, release of Hold Point, request for change, endorsement, approval, acceptance or deemed acceptance regarding any Contractor's Documents by (or on behalf of) the Principal.
- i) the Contractor is not relieved of its responsibilities and obligations under the Contract; and
- ii) the Principal has no liability whatsoever to the Contractor by reason of any errors, deficiencies or defects or omissions in any Contractor's Document.

Standard of Design

- .2 Subject to any changes made during the development of the design to ensure compliance with this Part, the design of the Works and any Temporary Works shall be:
 - (a) generally as shown in the design submitted with the Contractor's tender; and
 - (b) developed in a manner such that each stage of the design is consistent with, and a logical development of, the preceding version(s) of the design.
- .3 The Design shall not be of a lesser standard than any preceding version of the design with regard to any of the following:
 - (a) capacity;
 - (b) durability;
 - (c) aesthetics and visible features;
 - (d) whole of life performance;
 - (e) functional performance;
 - (f) safety;
 - (g) security;
 - (h) community amenity;
 - (i) community benefits; and
 - (j) user benefits.
- .4 If the Contractor considers that a requirement specified in this Contract cannot be achieved, it shall promptly advise the Principal and provide details of why that requirement cannot be achieved and the proposed alternative design solution.
- .5 Where more than one Designer prepares the design, the Contractor shall ensure that there is consistency in design assumptions, design methodology, design modelling and details.

Design Provided by the Principal

- .6 If a design has been prepared by the Principal (Reference Design), the Contractor acknowledges that the Reference Design:
 - (a) has been prepared solely for project planning purposes;
 - (b) has not been reviewed, checked or optimised for constructability or functionality;
 - (c) may not comply with the requirements of this Part;
 - (d) is provided for information only; and
 - (e) does not form part of the Contract.
- .7 The Contractor may not place any reliance on a Reference Design or any aspect of the Reference Design and the use of any aspect of the Reference Design is entirely at the Contractor's own risk.

7. DESIGN VERIFICATION AND VALIDATION

- .1 Further to Clause 8.3.4 "Design and development controls" of AS 9001, the Contractor shall ensure that Design verification and validation is undertaken throughout the design development phase to demonstrate that the design complies with all requirements of the Contract. The Contractor's Quality Plan shall specify, at a minimum, how the following requirements will be verified:
 - (a) legislative and regulatory requirements;
 - (b) construction safety considerations;
 - (c) compliance with Disability Standards issued under the subsection 31 (1) of the *Disability Discrimination Act 1992* (Cth), particularly the *Disability Standards for Accessible Public Transport*

2002 if access to public transport is within the Works and *Disability (Access to Premises – Buildings) Standards 2010*;

- (d) functional and operational requirements (e.g. performance, reliability and maintainability);
 - (e) aesthetic criteria;
 - (f) achievement of the Stated Purpose;
 - (g) the use of appropriate materials and finishes;
 - (h) compatibility of materials;
 - (i) anticipated environmental and load conditions;
 - (j) achievement of specified tolerances; and
 - (k) compliance with the technical requirements of the Contract.
- .2 The Contractor shall ensure that Design Verification and Validation is carried out by persons who:
- (a) are Chartered Professional Engineers;
 - (b) are suitably experienced, qualified, competent and possess appropriate expertise; and
 - (c) have not prepared or participated in any aspect of the design.

8. **DOCUMENT CONTROL**

General

- .1 Further to Clause 8.3.4 “Design and development controls” of AS 9001, the Contractor’s Quality Management System shall effectively and efficiently manage and control all Design Documents to ensure, at a minimum:
- (a) all Design Documents include the correct title information, revision, date of documentation and status;
 - (b) all personnel have access to, and are working from Design Documents that are the correct status and most recent revision; and
 - (c) the Principal and any independent verifier are advised of design changes.
- .2 The Contractor shall implement and maintain a register of Design Documents which:
- (a) enables the Design Documents to be searched by title and other key attributes;
 - (b) identifies all superseded, revised, current and planned Design Documents; and
 - (c) is accessible by the Principal and any independent verifier.
- .3 All Design Documents shall be numbered and identified in accordance with a numbering system provided by the Principal. In addition to the provision of hard copies, Design Documents shall be transmitted electronically through any IMS provided by the Principal or otherwise agreed between the parties.

Document Controller

- .4 The Contractor shall engage a lead document controller who:
- (a) is appropriately qualified and possesses a demonstrated understanding of the principles and practices of document control on major construction projects;
 - (b) has at least 5 years previous experience in document control on projects of similar nature, size and complexity using electronic IMS;
 - (c) if required, lead and manage other document controllers;
 - (d) until the Date of Completion, is not permitted to have any other duties that take precedence over their duties related to document control;
 - (e) audits the meta-data within the IMS at least monthly to ensure that the IMS meta-data is being entered accurately, consistently and in accordance with the Principal’s requirements; and
 - (f) remains dedicated to the role until all documents have been provided to the Principal.

9. THE DESIGN DOCUMENTS

General

- .1 The software used for the design and the drawing presentation shall be the version specified in the DPTI Technical Standards and Guidelines. If no version is specified, the software shall be the version current at the time that the design and drawings are being prepared.
- .2 The Design Documents shall comply with the DPTI Technical Standards and Guidelines and Table 9.2.1.

| <u>TABLE 9.2.1 DRAWING REQUIREMENTS</u> | |
|---|--|
| Structural drawings: | drawn in modelspace, presented in view ports in paperspace and shall be in accordance with DPTI: "Structures Group Drafting Guidelines for Consultants". |
| Road drawings, associated drawings, road geometric details and Cross Section Reports: | in accordance with DPTI: "Road Design Standards and Guidelines" |
| Rail drawings: | in accordance with AM4-DOC-000364 "Drafting Standard For AutoCAD drawings" and any other relevant DPTI rail standards. |

- .3 If the Contractor has been provided with design models or drawings of the Principal's existing infrastructure, the Contractor shall:
 - (a) advise the Principal which existing models or drawings have been superseded or require amendment as a result of the new design;
 - (b) complete a form, provided by the Principal, that tracks the checking and approval status of each drawing; and
 - (c) if instructed by the Principal, modify the Principal's drawings to record the new design including any necessary "as constructed details" or add superseding/part superseding notes that cross reference the new drawings created by the Contractor (Provisional Work).

Design Reports

The Contractor shall prepare a "Design Basis Report" which includes:

- (d) any interpretations, clarifications or assumptions made in relation to the design;
 - (e) all technical standards, references, material properties, durability, performance requirements, design loadings and design lives used for the design; and
 - (f) design methodology / rationale and design software.
- .4 The Contractor shall prepare Design Report(s) for each technical discipline described by the Principal. A Design Report is a summary of design work undertaken to date and at a minimum, each Design Report shall provide details of the following:
 - (a) identification of the stage of completion that the report describes (e.g. Notional 70% Design);
 - (b) identification of each construction package that the report relates to;
 - (c) the applicable Part / clauses / technical discipline in the DPTI Specifications that the work relates to;
 - (d) all relevant analysis and calculations for the Works and Temporary Work;
 - (e) the information which has been specified in each applicable Part of the DPTI Master Specifications to be included in the reports (refer to the Clause "Records" in each Part);
 - (f) summary of Hold Points released;
 - (g) requirements for land acquisition, special access or clearance from property boundaries;
 - (h) summary of any changes to the design since the previous issues of the design report;
 - (i) evidence of any required approvals;
 - (j) proposed maintenance regime;
 - (k) outline of the documentation that will be prepared for the operation / maintenance of the Works;
 - (l) any processes / procedures for commissioning of the Works; and

- (m) discussion regarding compatibility of the design with future expansion of the infrastructure.
- .5 The level of detail included in the draft Design Reports shall be commensurate with the percentage completion of the design. The Design Basis Report may be included in the Design Report.

Inspection, Maintenance and Operations Documentation

- .6 The Contractor shall prepare instructions / procedures describing the inspection and maintenance (and operations where appropriate) that the Principal will be required to undertake to ensure that the performance, functionality and durability of the Works do not deteriorate.

10. DIGITAL ENGINEERING

- .1 The Contractor shall provide:
 - (a) a Project Information Model (PIM) which is used throughout the delivery phase; and
 - (b) an Asset Information Model (AIM) for the asset management phase.
- .2 The PIM and AIM shall comply with the requirements specified in DPTI "Asset Information Requirements (Road Projects)"(AIR).

11. PROVISION OF THE DESIGN DOCUMENTS TO THE PRINCIPAL

Submission of Design Documents

- .1 The Contractor shall:
 - (a) forward the Design Documents to the Principal progressively and in a manner that does not result in an unreasonable number of Design Documents being submitted in any given week;
 - (b) provide a Design Document to the Principal within 5 working days of a request from the Principal to view the current draft of that document, and
 - (c) provide the Principal with a Design Document when that document reaches each stage specified by the Principal in the following formats:
 - i) electronic copies of all design drawings in pdf and dwg format as specified in Asset Information Requirements (Road Projects)
 - ii) electronic models as specified in Asset Information Requirements (Road Projects); and
 - iii) Design Reports in .pdf format.
- .2 If requested by the Principal, in addition to the electronic copies, the Contractor shall provide paper copies of the drawings (One set at A1 and up to 4 sets at A3) and Design Reports (up to 4 bound copies).
- .3 The Principal may specify timelines when a particular Design Document shall be forwarded by the Contractor to the Principal.
- .4 Provision of the draft Design Documents at the stages specified by the Principal shall constitute a **HOLD POINT** (refer to Clause 14 "Hold Points").
- .5 The Contractor acknowledges that:
 - (a) Receipt of Design Documents by (or on behalf of) the Principal is solely for the purpose of monitoring the performance and progress of the Contractor;
 - (b) The Principal owes no duty to the Contractor to review or examine any of the Design Documents submitted by the Contractor for compliance with the Contract or any applicable legislation;
 - (c) Notwithstanding any review, comment, release of Hold Point, request for change, endorsement, approval, acceptance or deemed acceptance regarding any Design Documents by (or on behalf of) the Principal:
 - i) the Contractor is not relieved of its responsibilities and obligations under the Contract; and
 - ii) the Principal has no liability whatsoever to the Contractor by reason of any errors, deficiencies or defects or omissions in any Design Documents which has been prepared by the Contractor.

Notionally 70% Complete Design Documents.

- .6 Notionally 70% complete Design Documents shall be sufficiently detailed to demonstrate that the design will meet the requirements of this CSTR.

Final Design Documents

- .7 The Final Design Documents shall be sufficiently detailed to enable construction to take place without further explanation or clarification from the Designer.
- .8 The Contractor shall provide to the Principal copies of the Final Design Documents (and any applicable verification certificates required under the Contract) relevant to an element of work at least 10 working days prior to construction commencing on that element of work.
- .9 Provision of the Final Design Documents shall constitute a **HOLD POINT** (“**Final Design Hold Point**”).

Issued for Construction (“IFC”) Documents

- .10 Following release of the Final Design Hold Point, the Contractor shall:
 - (a) identify the relevant Design Documents as IFC Documents, Revision 0;
 - (b) provide the Principal with the number of electronic and paper copies of the IFC Documents specified in Subclause 8.1; and
 - (c) construct the Works in accordance with the IFC Documents.

Changes to IFC Documents

- .11 After the release of the applicable Final Design Hold Point, any proposal by the Contractor to change the Works from that shown on an IFC Design Document or modify an IFC Document is deemed to be a request for a Variation for the Contractor’s convenience and is subject to the prior approval of the Designer and the Principal.

As Constructed Drawings

- .12 The Contractor shall prepare As Constructed Drawings for all of the Works, regardless of whether the actual construction varies from that shown on the IFC Drawings. As Constructed Drawings shall be identified in the Amendment Block.
- .13 Whenever the Works are constructed at variance with the IFC drawings, within 3 working days of the varied work commencing the Contractor shall notify the Principal of the extent of varied work and provide the relevant As Constructed Drawings within 4 weeks of the varied work being completed. All other As Constructed Drawings shall be provided to the Principal prior to the Date of Completion.

Inspection, Maintenance and Operations Documentation

- .14 Draft inspection and maintenance procedures shall be submitted to the Principal at the Final Design Hold Point.
- .15 The final inspection and maintenance procedures shall be submitted to the Principal at least 60 Working Days prior to Completion.

12. TRAFFIC CONTROL DRAWINGS

- .1 This sub-clause only applies where traffic control devices will be installed.
- .2 At least 14 days prior to the installation of any permanent or semi-permanent Traffic Control Devices, the Contractor shall provide the applicable Traffic Control Drawings to enable the Principal to obtain approval for the devices.
- .3 Provision of the Traffic Control Drawings shall constitute a **HOLD POINT** (refer to Clause 14 “Hold Points”).

13. INSPECTION AND CERTIFICATION**Inspection of Site**

- .1 As soon as practicable (and in no case after the completion of notionally 30% of the design), the Designer, or a competent representative of the Designer, shall undertake a field inspection of the entire Site to verify that the design takes into account all physical features that would be reasonably apparent during a field inspection. The Designer shall prepare a “Site Assessment Report” describing the scope of the inspection and any issues that require attention identified as a result of the inspection.
- .2 Provision of the Site Assessment Report shall constitute a **HOLD POINT** (refer to Clause 14 “Hold Points”).

Inspection of Works

- .3 The Contractor shall ensure that the Designer inspects the Works or relevant parts thereof when so required by the Contractor or by the Principal. If requested by the Principal, whenever the Designer is requested to inspect the Works, the Contractor shall obtain from the Designer a certificate stating that:
- (a) the Designer has inspected the Works or relevant parts thereof; and
 - (b) any relevant assumption relating to the actual site conditions that the design was based on (e.g. geotechnical conditions) remains valid.
- .4 The Contractor shall provide the certificate to the Principal within one working day of the Designer inspecting the Works.

Design Certification

- .5 The Contractor shall ensure that certificates of compliance for all of the Works are prepared and submitted to the Principal which:
- (a) certify that the Design Documents comply with the requirements of this Contract;
 - (b) are forwarded to the Principal within Business Days of completion of the verification and at least 5 Business Days prior to the commencement of construction that part of the works which is the subject of the certificate;
 - (c) are signed by authorised representatives of the Contractor and the Designer;
 - (d) are in accordance with the form specified in the Contract Specific Requirements; and
 - (e) unless agreed otherwise with the Principal, are not qualified in any way which would lessen the effect of the certificate.

14. HOLD POINTS

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

| CLAUSE REF. | HOLD POINT | RESPONSE TIME |
|--------------------|--|----------------------|
| 2.2 | Provision of Design Management Plan | 10 Business Days |
| 11.1.4 | Provision of draft Design Documents at the stages specified by the Principal | 10 Business Days |
| 11.9 | Provision of Final Design Documents | 10 Business Days |
| 12.3 | Provision of Traffic Control Drawings | 10 Business Days |
| 13.2 | Provision of Site Assessment Report | 10 Business Days |