

# Project Controls

## Master Specification

## PC-EDM1 Design Management

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## Document Management

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## PC-EDM1 Design Management

### 1 General

- 1.1 This part specifies the requirements for the design of Road and Structural Infrastructure.
- 1.2 Contractor must comply with:
  - a) WHS: Work Health and Safety (South Australia) Act 2012 and Regulations;
  - b) AS15288: Systems and Software Engineering – System Life Cycle Processes;
  - c) ISO/IEC 29148: Systems and software engineering – life cycle processes – requirements engineering;
  - d) ISO/IEC 26702: Systems engineering – application and management of the systems engineering process.

### 2 Contractor's Design Obligations

- 2.1 The Contractor acknowledges that the development of the design to meet the project requirements of this Contract is the sole responsibility of the Contractor.
- 2.2 The Principal has no obligations in respect of the development of the design, except where specified otherwise.
- 2.3 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;
- 2.4 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 the project requirements or any applicable legislation;
- 2.5 Notwithstanding any review, comment, release of **Hold Point**, request for change, endorsement, approval, acceptance or deemed acceptance regarding any Contractors' Documents by (or on behalf of) the Principal:
  - a) the Contractor is not relieved of its responsibilities and obligations under the Contract; and
  - b) the Principal has no liability whatsoever to the Contractor by reason of any errors, deficiencies or defects or omissions in any Contractor's Document.

### Wilful Default

- 2.6 The Construction of permanent Works, prior to the Acceptance of the "Issued for Acceptance" Design gate **Hold Point** by the Principal, without the written acceptance by the Principal, shall be deemed a "Wilful Default" in accordance with the Contract.

### 3 Standard of Design

- 3.1 Work under the Contract must be designed to meet the requirements of:
  - a) this Contract, including all standards, guidelines and codes referenced therein; and
  - b) any clarifications or interpretations of standards, codes and guidelines contained within the Contract.
- 3.2 Subject to any changes made during the development of the design to ensure compliance with this Contract, the design of the Works and any temporary works shall be:
  - a) generally as shown in the design submitted with the Contractor 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.

- 3.3 The design must not be of a lesser standard than the Tender Design or any preceding version of the design.
- 3.4 Where the Contractor identifies a specified requirement cannot be achieved, it must immediately notify and the Principal in accordance with the Contract.
- 3.5 Provision of notice that a specified requirement cannot be achieved shall constitute a **Hold Point**.
- 3.6 The Contractor shall provide advice and details of why the requirement cannot be achieved and the proposed alternative design solution(s) for consideration by the Principal, within 10 Working Days of notifying the Principal in accordance with clause 3.4.

## 4 Design Provided by the Principal

- 4.1 If a design has been prepared by the Principal (reference design / concept design / sketch / schematic design), the Contractor acknowledges that the design prepared by the Principal:
  - a) is provided for information only;
  - b) has been prepared solely for project planning purposes;
  - c) may not comply with the project requirements;
  - d) has not been reviewed, checked or optimised; and
  - e) does not form part of the Contract.
- 4.2 The Contractor may not place any reliance on a design prepared by the Principal or any aspect of the design prepared by the Principal.
- 4.3 The use of any aspect of any design prepared by the Principal is entirely at the Contractor's risk.

## 5 Design Management

### Design Management Plan

- 5.1 The Contractor must develop, implement and comply with a Design Management Plan for the management of the engineering and design activities.
- 5.2 The Design Management plan shall be submitted prior to within 10 working days of Contract Award or prior to commencing design activities.
- 5.3 Provision of the Design Management Plan, or any proposed amendments to the Design Management Plan shall constitute a **Hold Point**.
- 5.4 The Project Design Management Plan must provide details including, but not limited to:
  - a) organisational chart of design personnel;
  - b) competencies management of the personnel undertaking design work;
  - c) methodology to capture project requirements and verify the achievement;
  - d) design packages, work breakdown structure, packages and design program;
  - e) management of the design stage review and deliverables;
  - f) interface management of both technical design disciplines and construction activities;
  - g) processes for capture and recording of design decisions;
  - h) safety in design process;
  - i) management of Designer's Verification;
  - j) interface with the Risk Management Plan;
  - k) management of Design Documents; and
  - l) identifying and managing Hold Points during design activities.

- 5.5 The Design Management Plan may be integrated management with other project management plans (e.g. for smaller less complex projects).

### Contractor's Proposed Alternative Approach

- 5.6 The Contractor may propose alternative design management approach outside the requirements specified in this Part, (e.g. for smaller less complex projects, or low risk elements).
- 5.7 Any submission of a proposed alternative approach shall demonstrates that the alternate approach aligns with intent of the design management process, the benefit to the Principal of the alternate approach and a risk assessment to all parties of the alternate approach.
- 5.8 The Principal is under no obligation to accept any proposed alternate systems engineering based approach.
- 5.9 Submission of a proposal for alternative design management approach constitutes a **Hold Point**.

### Design Program

- 5.10 The Project Program must incorporate an integrated Design Program.
- 5.11 The design program shall be submitted to the Principal within 10 working days of the Contract Award.
- 5.12 Provision of the design program shall constitute a **Hold Point**.
- 5.13 At a minimum, the Design Program must provide details of the following:
- a) design activities, which are correlated with the Contractor work breakdown structure ("WBS") for each discrete element of the Works and the Temporary Work;
  - b) the time for the development and submission of the Preliminary, Detailed and Final Design Documents;
  - c) the time allowed for Construction and Designer's Verification and Road Safety Audits (if applicable);
  - d) the time allowed for review by the Independent Design Certifier and the Principal;
  - e) the time allowed for the release of Hold Points;
  - f) the time allowed for traffic control drawings and traffic signal controllers;
  - g) design gates including workshops;
  - h) float and the critical path of all design packages.
- 5.14 If the design program is revised the Contractor must provide a copy to the Principal of any revised Design Program within 10 working days of the revised Design Program being approved by the Contractor for implementation.

### Work Breakdown Structure

- 5.15 The Contractor must prepare a work breakdown structure which identifies the design packages for the design of individual elements of the Works and the design disciplines associated with each individual element.
- 5.16 The work breakdown structure must be commensurate with the complexity of the Works and be integrated with the Design Program.
- 5.17 The work breakdown structure is to be submitted to the Principal within 10 working days of the Contract Award
- 5.18 Provision of a work breakdown structure shall constitute a **Hold Point**.
- 5.19 If the work breakdown structure is revised, the revised work breakdown structure must be provided to the Principal's Representative with a revised Design Program.

## Safety in Design

- 5.20 The development and management of the design must be integrated with the Safety in Design detailed in PC-EDM2 "Safety Management in Design".

## Sustainability in Design

- 5.21 The development and management of the design must be integrated with the Sustainability in Design detailed in PC-EDM6 "Sustainability in Design".

## Maintenance in Design

- 5.22 The Contractor must have a documented maintenance in design procedure outlining the process of identifying and managing design implications to minimise future maintenance activities and provide efficient and safe maintenance access.
- 5.23 A maintenance in design assessment must be undertaken in conjunction with DPTI nominated maintenance personnel.
- 5.24 The maintenance in design assessment is to be documented and integrated with the maintenance access strategy and training requirements as detailed in PC-CN2 "Asset Handover".

# 6 Design Documents

## Design Basis & Site Assessment Reports

- 6.1 The Contractor must prepare a "Design Basis Report" to define the requirements for each technical discipline of work which including but not limited to:
- a) any interpretations, clarifications or assumptions made in relation to the project requirements;
  - b) all technical standards, references used to define the requirements;
  - c) material properties, durability, performance requirements, design loadings and design lives used for the design; and
  - d) design methodology / rationale and design software.
- 6.2 The designer must undertake a field inspection of the site to verify the site features that would reasonably be apparent during a site inspection.
- 6.3 The outcome of the site inspection is to be documented in a site assessment report detailing the scope of the inspection and any issues identified during the inspection.
- 6.4 The design basis and site assessment may be part of the design report and shall initially be submitted at the requirements definition stage (15%).
- 6.5 The provision of the Design Basis & Site Assessment shall constitute a **Hold Point**.

## Design Report

- 6.6 The Contractor must prepare Design Reports for each technical discipline and each package (where applicable).
- 6.7 A Design Report is a summary of design work undertaken to date must provide details of the following as a minimum:
- a) identification of the design package & design review stage;
  - b) design decisions and issues to describe the design development process;
  - c) all relevant analysis and calculations for the Works and Temporary Work;
  - d) the information which has been specified in each applicable Part to be included in the reports (refer to the Clause "Records" in each Part);
  - e) summary of any changes to the design since the previous issues of the design report;

- f) summary of Hold Points released & evidence of any required approvals;
  - g) outline of the documentation that will be prepared for the operation / maintenance of the Works and processes / procedures for commissioning of the Works.
- 6.8 The level of detail included in the draft Design Reports must be commensurate with the design package and percentage completion of the design.

## Design Drawings

- 6.9 The Design Drawings are to be in accordance with DPTI: "Road Design Technical Standards and Guidelines", in particular DP001 "General Requirements".
- 6.10 DPTI standards and guidelines are available from <https://www.dpti.sa.gov.au/standards>.
- 6.11 The Design Drawings must comply with the following:
- a) the drawing number and title must be in accordance with DPTI standards and project specific requirements;
  - b) drawings must only be developed on A1 sheet sizes;
  - c) CAD files detailed plan view or general arrangement must be based on the Survey coordinates location and scale (i.e. local GDA and metres); and
  - d) design models must be in a plane coordinate system based on the survey control marks and survey dataset supplied by the Principal.
- 6.12 The Principal may consider an alternative approach to hard copy drawings utilising a digital engineering model, were the Contractor can demonstrate the benefit to the Principal through the complete Engineering lifecycle. This clause is not applicable for Traffic Control or Traffic Signal drawings.
- 6.13 Acceptance an alternate digital engineering approach to design drawings shall constitute a **Hold Point**.

## Traffic Control & Traffic Signal Design Documents

- 6.14 This sub-clause only applies where Traffic Control Devices and Traffic Signals will be installed.
- 6.15 The Traffic Control and traffic signal design documents shall comply with the following DPTI requirements:
- a) DPTI Manual of Legal Responsibilities and Technical Requirements for Traffic Control Devices;
  - b) DPTI - Pavement Marking Manual; and
  - c) DPTI - Road Sign Guidelines: Guide to visitor and service road signs in South Australia.
- 6.16 The Contractor shall develop and submit a traffic impact statement with the Traffic Control Drawings.

## Construction Specification

- 6.17 The Contractor must prepare and develop the Construction Specification, which must be adequate and suitable for use with the Contractor's design.
- 6.18 The Construction Specification shall result in a standard, performance and durability not less than that which would be achieved using the DPTI Master Specification.
- 6.19 If there is no appropriate DPTI Specification applicable the Construction Specification shall be developed based on an appropriate specification from other Commonwealth or state authorities or on applicable Australian Standards or Codes of Practice
- 6.20 The preliminary construction specification must be provided with the Preliminary Design.
- 6.21 The final Construction Specification must be provided with the Final Design.
- 6.22 Compliance with the requirements of the Construction Specification does not relieve the Contractor of the obligation to comply with any other requirement of the Contract

## Digital Engineering Model (BIM)

- 6.23 DPTI encourage the development of digital engineering that use of intelligent design models to satisfy technical handover requirements or Asset Information Requirements that will make up the Asset Information Model.
- 6.24 The development and management of the digital engineering model must be integrated with the Design process and as detailed in PC-EDM7 “Digital Engineering”.

## Review Comments and Issues Register

- 6.25 The Contractor must plan and implement procedures to capture, process and close out comments received from stakeholders during Design Gate review processes for each individual design package. These must be logged in an issues and comments register, and the Contractor shall respond to each individual issue or comment.
- 6.26 The issues and comments register must be updated and submitted at each design submission for each individual design package.
- 6.27 The design management plan must detail the process for the capture, processing and closed out of stakeholder comments throughout the gated review process.

## 7 Submission of Design Documents

- 7.1 The Contractor must:
  - 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.
- 7.2 In addition to the electronic copies, the Contractor must provide bound paper copies of the Design Documents (minimum 2 sets drawings at A3).

### Tender Design Documents (Notionally 15% Complete)

- 7.3 The Contractor shall submit their notionally 15% design with their tender in accordance with the Tender Requirements.

### Preliminary Design Documents (Notionally 30% Complete)

- 7.4 The Contractor shall develop their preliminary design documents (notionally 30% complete) to a level of sufficient detail to demonstrate the major design features and functionality prior to advancing to the detailed design stage.
- 7.5 Provision of the preliminary design documents shall constitute a **Hold Point**.

### Detailed Design Documents (Notionally 70% Complete)

- 7.6 Detailed design documents (notionally 70% complete) must be sufficiently detailed to demonstrate that the design will meet all the project requirements.
- 7.7 Provision of the detailed design documents shall constitute a **Hold Point**.

### Final Design Documents

- 7.8 The Final Design Documents must be sufficiently detailed to enable construction to take place without further explanation or clarification from the Designer.

- 7.9 The Contractor must provide to the Principal's Representative 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.
- 7.10 Provision of the Final Design Documents shall constitute a **Hold Point**.

#### Traffic Control & Traffic Signal Design Documents

- 7.11 This sub-clause only applies where the Final Design documents incorporate Traffic Control and Traffic Signals design documents.
- 7.12 The Contractor must provide the applicable Traffic Control Drawings and Traffic Impact Statement at least 15 working days, prior to the installation of any permanent or semi-permanent Traffic Control Devices (to enable the Principal to obtain approval for the devices from a Recognised Traffic Practitioner).
- 7.13 Provision and acceptance of the Final Traffic Control & Traffic Signal Design Documents by a Recognised Traffic Practitioner shall constitute a **Hold Point**.
- 7.14 Details of the approvals for the installation of traffic signals are provided in RD-EL-C2 "Installation of Traffic Signals".
- 7.15 Following Acceptance of the Final Traffic Control & Traffic Signal Design Documents the Contractor shall request for the creation of traffic signal "personalities".
- 7.16 Traffic signal programming of traffic signal "personalities" is undertaken by DPTI Traffic Management Centre. The DPTI Traffic Management Centre requires 8 weeks to complete the traffic signal personalities.
- 7.17 Submission of information to enable the development of the traffic signal personality(s) shall constitute a **Hold Point**.

#### **Issued for Acceptance ("IFA") Documents**

- 7.18 Following the Final Design Gate, the Contractor shall submit an issued for acceptance submission to the Principal including:
- a) the final design documents with any changes as required from the Final Design review process to enable issuing of design certificates;
  - b) the design certificates;
  - c) independent design certificates;
  - d) acceptance of the Traffic Control documents and drawings; and
  - e) any relevant written approvals from third party asset owners.

#### **Issued for Construction ("IFC") Documents**

- 7.19 Following release of the Issued for Acceptance **Hold Point**, the Contractor shall update the design documents from the Issued for Acceptance submission to identify the design documents as an IFC documents, revision 0, with the acceptance information provided by the Principal.

#### **Completion Design Documents**

- 7.20 The Contractor shall submit completion design documents (As-Built) in accordance with PC-CN2 "Asset Handover".
- 7.21 The Contractor must prepare technical maintenance plans instructions / procedures describing the inspection and maintenance (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.
- 7.22 Submission of the completion design documents shall constitute a **Hold Point**.

## 8 Design Gate Reviews

- 8.1 The Contractor must present the design at the specified design gate reviews to the Principal in sufficient detail to determine the design will achieved the design intent.
- 8.2 Documentation to support the Design Gate Review must be provided to the Principal a minimum of 5 working days prior to the applicable gate review.
- 8.3 At each gated review, the Principal may:
  - a) permit work to proceed;
  - b) permit work to proceed, provided that specified changes are implemented by the Contractor; or
  - c) Prohibit work from proceeding until the documentation is revised and resubmitted.
- 8.4 Notwithstanding any review, comment, endorsement, acceptance or deemed acceptance or release of **Hold Point** of a design gate review by (or on behalf of) the Principal:
  - a) the Contractor is not relieved of its responsibilities and obligations under the Contract; and
  - b) the Principal has no liability whatsoever to the Contractor by reason of any errors, deficiencies or defects or omissions in any Contractor's Document.

### Preliminary Design Gate Review (30%)

- 8.5 The Contractor must convene and host a preliminary design gate review for each individual discipline with the Principal's key personnel at completion of the preliminary design of major design packages.
- 8.6 The preliminary design gated review is formalised assessment to present the holistic design solution of all technical disciplines and demonstrate the major design feature and functionality of the design achieve the requirements of the Contract.
- 8.7 The Preliminary Design Gate review is to identify potential deficiencies with compliance to project requirements in the preliminary design and the holistic design solution prior to the Contract proceeding to Detailed and Final design.
- 8.8 The preliminary design gate shall demonstrate the preliminary design achieves the specified operational outcome (e.g. traffic or rail operational performance).
- 8.9 The acceptance of "permit work to proceed" at the preliminary gate review for each individual discipline constitutes a **Hold Point**.

### Detailed Design Gate Review (70%)

- 8.10 The detailed design gate reviews shall be completed on individual technical design packages following submission of the detailed design package information.
- 8.11 The acceptance of "permit work to proceed" at the detailed gate review for each individual design package constitutes a **Hold Point**.

### Final Design Gate Review (100%)

- 8.12 The detailed design gate reviews shall be completed on individual technical design packages, including specifications following submission of the final design package information.
- 8.13 The acceptance of "permit work to proceed" at the Final Gate review for each individual technical design package constitutes a **Hold Point**.
- 8.14 Following release of the Final Design Gate **Hold Point** the Contractor can process to an "Issued for Acceptance" submission.

### Issued for Acceptance (IFA) Design Gate

- 8.15 The Contractor must provide to the Principal the "Issued for Acceptance" design gate submission relevant to an element of work at least 10 working days prior to construction commencing on that element of work.

- 8.16 At the “Issued for Acceptance” Design Gate, the Principal may:
- a) accept the design documents - and permit them to be updated and identified as “Issued for Construction”;
  - b) accept the design documents - provided that specified changes are implemented prior to the documents being updated and identified as “Issued for Construction”; or
  - c) reject the design documents and provide details on why the Issue for Acceptance design documents have not been accepted.
- 8.17 In the event the “Issued for Accepted” Design Documents are rejected by the Principal, the Contractor shall revised, modify and / or amend their documents and re-submit the documents in a revised “Issued for Acceptance” submission.
- 8.18 Acceptance of the “Issued for Acceptance” Design documents by the Principal shall constitute a **Hold Point**.
- 8.19 Construction of Works prior to the Principal accepting the “Issued for Acceptance” design documents shall be deemed “Wilful Default” in accordance with the Clause 2.6 and the Contract Conditions.
- 8.20 Following release of the “Issued for Acceptance” **Hold Point** the Contractor shall update the drawings and issue an “Issue for Construction (IFC)” Design document submission.

## Changes to IFC Documents Design Gate

- 8.21 In a Construction only contract, 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 convenience and is subject to the prior approval of the Designer and the Principal.
- 8.22 The Designer shall assess the nature of any change proposed to and IFC design to determine if potentially have an impact on the integrity, nature or functionality of the design the design or is of minor nature to correct an error or omission.
- 8.23 Where the change to the IFC Design is not considered minor of nature the Designer shall:
- a) undertake all design assessment, analysis, integration to ensure the revised design complies with the Requirements; and
  - b) complete a Designer’s Verification on the change including an updated certificate.
- 8.24 Where the IFC design element was subject to Independent Design Certification the Contractor shall engage the IDC to review and update their certificate in accordance with PC-EDM3 “Independent Design Certification”.
- 8.25 The Submission and Acceptance of the revisions to the IFC Design Documents including certificates shall constitute a **Hold Point**.

## 9 Design Verification & Certification

### Designer’s Verification

- 9.1 The Designer shall undertake, verification of its own the design in accordance with the designers Quality Assurance procedures.
- 9.2 The Designer’s Verification shall include an inter-disciple review of the design to ensure integration between different work packages.

### Contractor’s Review

- 9.3 The Contractor shall undertake a review of the design to consider constructability and integration of the design with construction staging or any temporary Works.

## Independent Design Certifier

- 9.4 Where specified in the Project Scope the design shall be reviewed by an Independent Design Certifier to check the design for compliance to the requirements.
- 9.5 The Independent Design Certification shall be undertaken in accordance with PC-EDM3 "Independent Design Certification".

## Third Party Asset Owners

- 9.6 Where the design includes any modification or change to a third party asset (e.g. Council asset or authority Service) the design shall be reviewed by the third part asset owner to confirm compliance with the asset owner's requirements.

## 10 Design Certificates

- 10.1 The Contractor must ensure that Certificates to confirm the Design compliance to the requirements are prepared and submitted to the Principal's Representative which:
- certify that the design documents comply with the requirements of this Contract and project requirements;
  - are forwarded within "issued for acceptance" submission;
  - are signed by authorised representatives of the Constructor and the Designer;
  - are in accordance with the form included in Appendix 1: Designer's – Certificate of Compliance.
- 10.2 unless agreed otherwise in writing with the Principal's Representative, design certificates are not qualified in any way which would lessen the effect of the certificate;
- 10.3 Submission of the Design Certificate with the Issued for Acceptance submission shall constitute a **Hold Point**.

## 11 Construction Phase Services

- 11.1 During the construction phase, representatives of the designer's organisation shall be available to support the construction team and construction verifier in the following areas:
- Requests for Information - Provision of responses to requests for information to address design errors, clarify ambiguities and deal with site based challenges during the construction of the design;
  - Design Validation - Inspecting all or parts of the works on site to ensure that it aligns with the design intent if required under the Project's Contract or requested for other purposes;
  - Shop Drawings and Vendor Documents - reviewing and approving shop drawings or vendor data to ensure that it aligns with the intent of the design;
  - Non-conformances – review the impact on the design of any Non-conformances as a part of the construction process.
- 11.2 Records of all construction phase services provided shall be provided to the Principal at project completion;

## 12 Hold Points

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

Document Ref	Hold point	Response time
3.5	Notice a requirement cannot be achieved.	10 working days
5.3	Design management plan	10 working days
5.9	Alternate design management approach.	10 working days
5.12	Design Program	10 working days
5.18	Work Breakdown Structure	10 working days

Document Ref	Hold point	Response time
6.5	Design basis & site assessment	10 working days
6.13	Alternate digital engineering approach	15 working days
7.5	Preliminary design documents	10 working days
7.7	Detailed Design documents	10 working days
7.10	Final Design documents	10 working days
7.13	Final design Traffic Signal Design Drawings	10 working days
7.17	Information for the Traffic Signal Personalities	8 weeks
7.18	"Issued for Acceptance" Design Documents	5 working days
7.22	Completion design documents	10 working days
8.9	"permit word to proceed" at the Preliminary Design gate review	N/A
8.11	"permit word to proceed" at the Detailed Design gate review	N/A
8.13	"permit word to proceed" at the Final Design gate review	N/A
8.18	Accepting the "Issued for Acceptance" design documents	N/A
8.25	Accepting changes to the IFC Design Documents	10 working days
10.3	Submission of the Design Certificate	5 working days

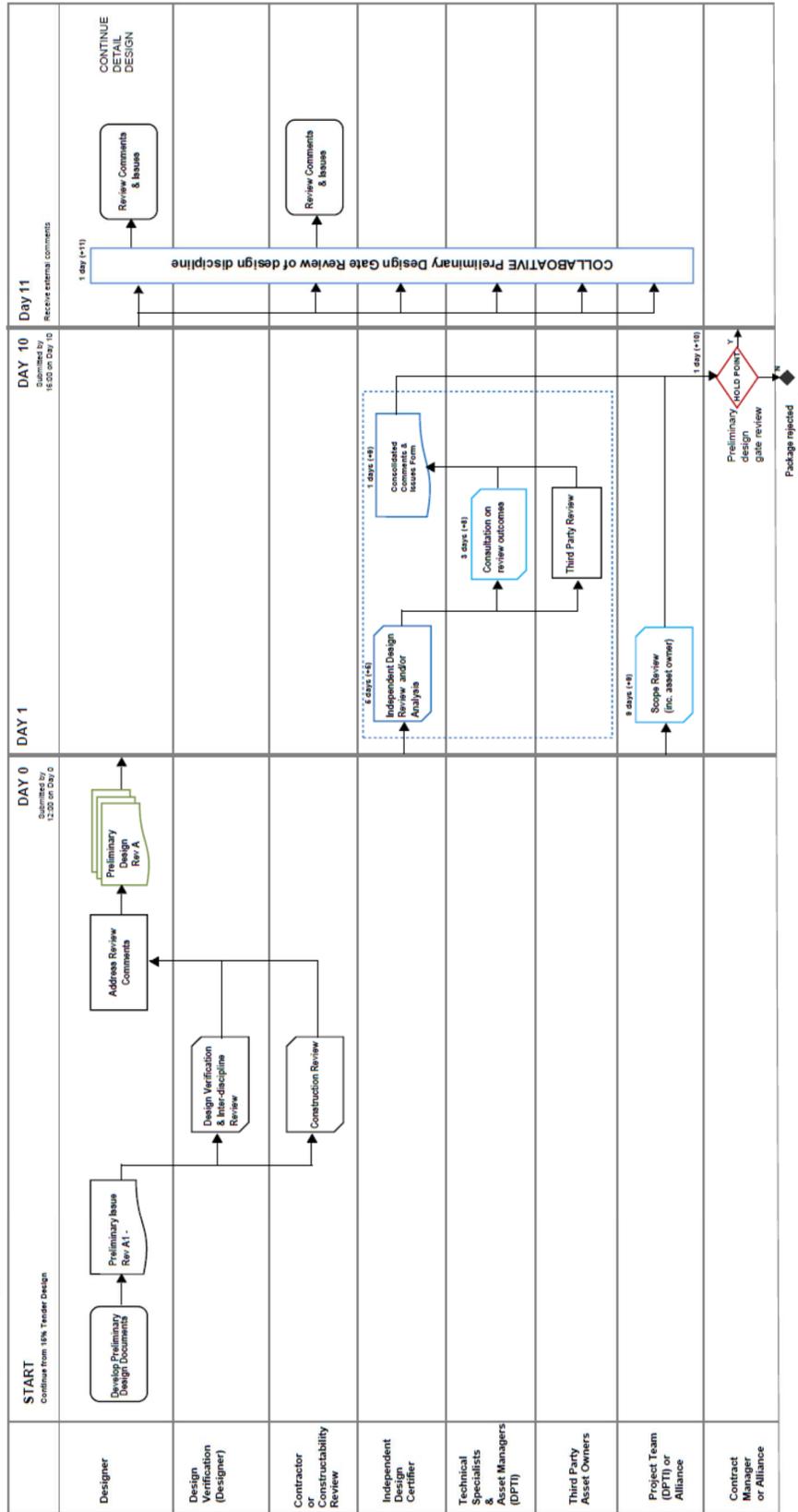


# 14 Appendix 2: Design Process Flow Charts



## Preliminary Design 30%, Package Flow Chart.

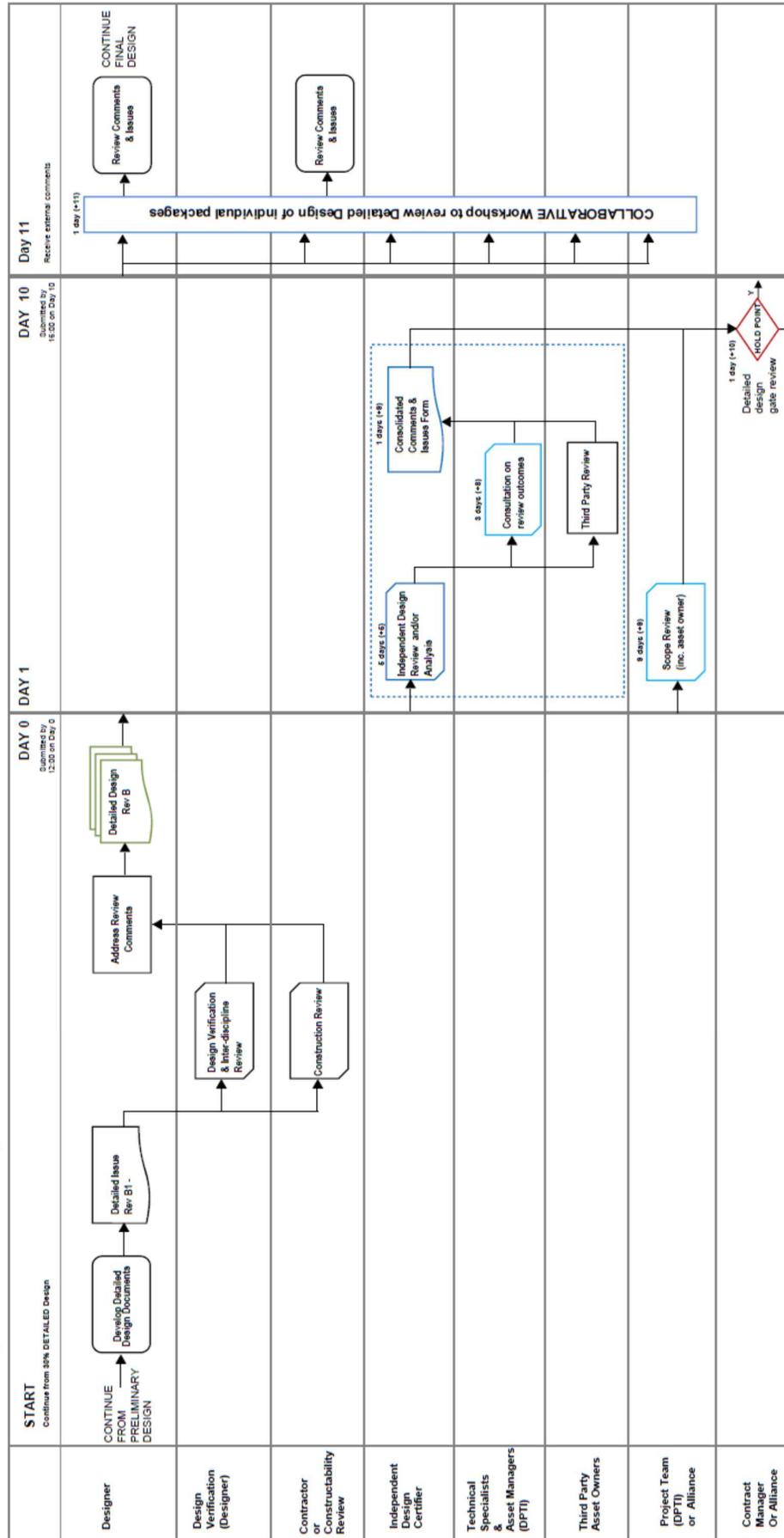
Engineering and Design Management Framework, Design Gate 4A





### Detailed Design 70%, Package Flow Chart.

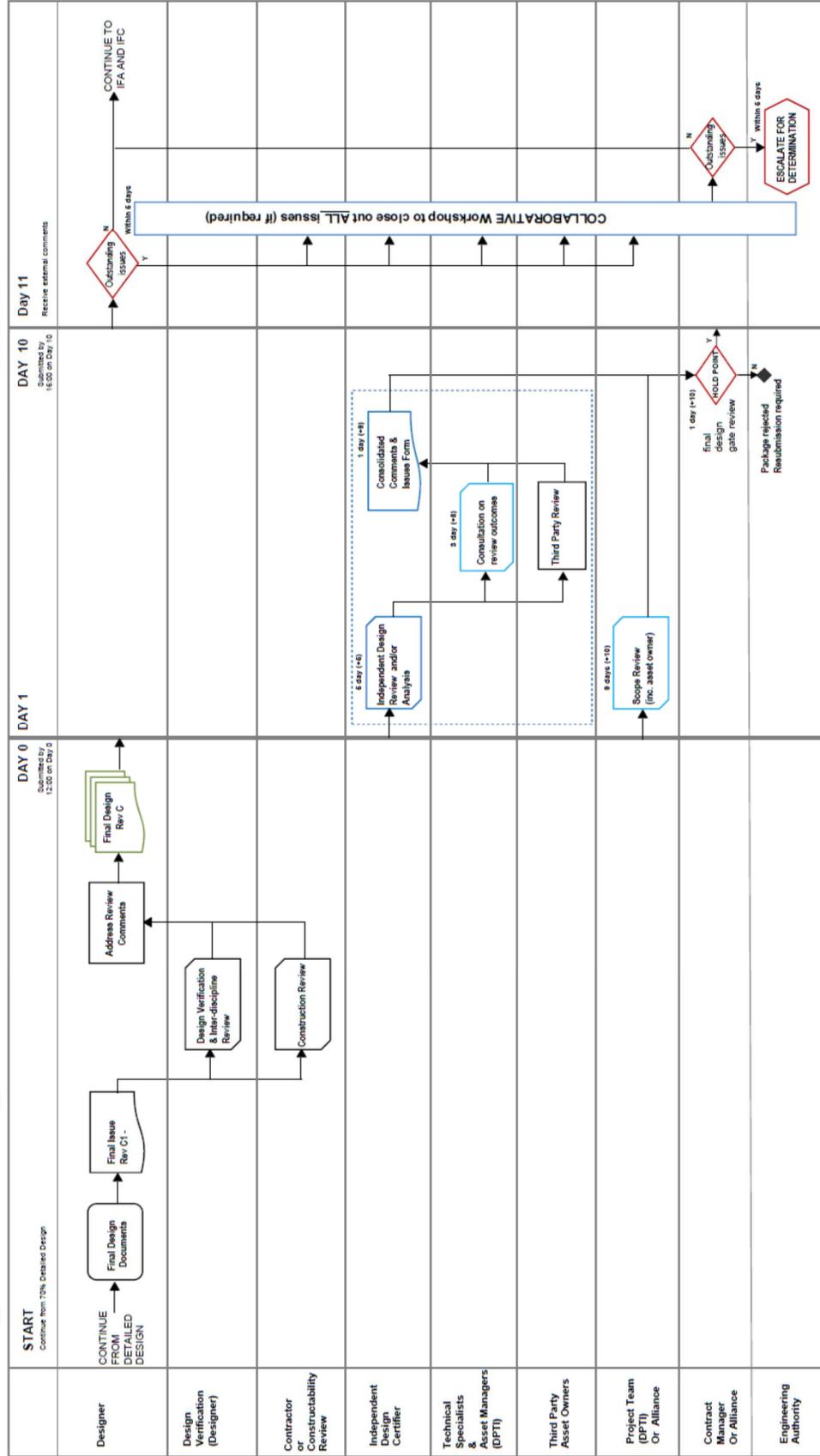
### Engineering and Design Management Framework, Design Gate 4B





### Final Design 100% - Package Flow Chart.

### Engineering and Design Management Framework, Design Gate 4C





IFA - IFC Package Flow Chart.

Engineering and Design Management Framework,  
Design Gate 4C

