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Engineering Procedure
Design

EPD 0013

TECHNICAL REVIEWS

Version 3.0

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Document control

Version	Date	Summary of change
1.0		First issue
1.1		Section numbering updated, Reference corrections and Document Control Page added.
1.2		Replace reference from RIC to RailCorp
1.3	August 2005	Standardising Format
2.0	January 2009	General updating and clarification. Reference to RPMM-RAE.
3.0	September 2011	See Table below

Summary of changes from previous version

Summary of change	Section
Editorial changes and text altered for clarification	General
References updated	General
Description of technical review enlarged.	1
“low and high complexity” removed – procedure relates to any project	1, 5.6, 6.7
Scope more specific.	2
Reference documents updated and background documents added	3
Terms, definitions and acronyms added	4
Add Definitions– discipline head , “project design manager” previously “design delivery manager”; project sponsor	4
Reference to TMA 413 Technical Reviews Manual added	2, 3
Text on RPMM complexity determination tool added	5.2
Text on review process expanded. Heading added. Fig 1: baselines shown.	5.3.1
General requirements clarified. Table 1: RPMM project phase shown. SCR purpose updated.	5.3.2
SCR description clarified. Discipline heads to take part rather than “RailCorp engineering staff”	5.4
SDR outcome clarified,	5.5
PDR outcome described.	5.6
Text on outcomes added.	5.7
Added “relevant stakeholders as necessary”	5.6.2
Operational Readiness Review added to heading	5.8.1
Add reference to EPA 280	5.8.2
Responsibilities for Project manager, Project sponsor, Discipline heads, Technical reviewers and Other stakeholders added. Project delivery manager changed to project design manager. Integrated support staff removed.	6
Deleted references to stage codes 30%, 70%, 100%	App A
Electrical example deliverables and Signalling example deliverables changed.	App A
New flow chart	App B

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1 Introduction

Technical reviews are essential to provide assurance that a system being developed will meet specified requirements for the project and that the requirements and design intent of the customer are understood by the development team. These reviews provide a major input to the verification and validation processes for projects.

Each review serves a specific purpose within the overall project development cycle and is structured to provide the opportunity to review proposed concepts and key design assumptions against specified requirements at each design stage.

Technical reviews also serve as a major element of risk reduction and management activity within a project. In particular the reviews provide the opportunity to identify potential departures from the design intent for the project at the earliest possible time and to ensure that corrective action is implemented with minimal impact on cost and schedule.

2 Scope

This procedure provides an overview of the technical review process applicable to RailCorp projects. It describes the review scope and objectives, typical deliverables required at each review milestone and the review process.

For further guidance on technical reviews, refer *TMA 413 Technical Reviews Manual*.

3 Reference documents

RPMM Program Management Guidelines from the suite of guidelines included in: RailCorp Project Management Methodology Rail Asset Enhancement Guidelines (RPMM RAE)

EPA 280 Design Acceptance

TMA 413 Technical Reviews Manual

Background documents

AS/NZS 15288 Systems engineering – System life cycle processes

ISO/IEC 26702 (IEEE Std 1220-2005) Systems engineering — Application and management of the systems engineering process

ANSI/EIA-632 Processes for Engineering a System

INCOSE Systems Engineering Handbook

NASA Systems Engineering Handbook

4 Terms and definitions

The following terms and definitions used in this procedure are derived from *EPD 0001 Design management process* or as otherwise indicated.

configuration interrelated functional and physical characteristics of a product defined in the **product configuration information** (see definition below) (from *AS ISO 10007 Quality management systems - Guidelines for configuration management.*)

configuration management (CM) coordinated activities to direct and control configuration (from *AS ISO 10007*)

customer the organisation or position requesting or initiating a design task

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design (verb) the process of defining, synthesising, selecting, and describing solutions to requirements in terms of products and processes

design (noun) the product of the process of designing that describes the solution (conceptual, preliminary or detailed) of the system, system elements or system end items

design (configuration) change any change that affects the physical or functional characteristics of the infrastructure including operating limitations and conditions of use, hardware and software (including programmable electronic systems)

discipline head person recognised as having responsibility for assuring technical integrity of a particular class of assets (e.g. Chief Engineer Track being responsible for assuring technical integrity of track infrastructure) (from *SMS-12-PR-0371 Managing Engineering Design Control*)

hazard a condition that is a potential source of harm (from *SMS-06-GD-0031 Hazard Identification and Safety Risk Assessment*)

interface common boundary or point of connection between two or more items or systems.

product configuration information requirements for product design, realisation, verification, operation and support (from *AS ISO 10007*)

project design manager the person responsible for design management of a project

project sponsor the person responsible for ensuring the project outcomes deliver the benefits (Benefit Realisation) as defined in the Sponsors Brief and Business Case. (Further description in *RPMM glossary*.)

reliability probability that a specified item will perform a specified function within a defined environment, for a specified length of time

risk see 'safety risk'

safety risk combination of the likelihood of a hazard being realised and its consequence (from *SMS-06-GD-0031 Hazard Identification and Safety Risk Assessment*)

specification a document that fully describes a design element or its interfaces in terms of requirements (functional, performance, constraints, and design characteristics) and the qualification (validation) conditions and procedures for each requirement

validation the process of ensuring that the final product conforms to defined user (customer) needs and/or requirements

verification process carried out to ensure that the output of a design stage (or stages) meets the design stage input requirements

Acronyms and abbreviations

The following acronyms and abbreviations are used in this procedure.

CDR	critical design review
PCA	physical configuration audit
PDR	preliminary design review
RPMM	RailCorp Project Management Methodology
SCR	system concept review
SDR	system definition review
SOW	statement of work
SVR	system verification review

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5 Requirements

5.1 Technical reviews to be specified for design projects

The requirement for formal technical reviews shall be included in:

- the project management plan for all projects undertaken by RailCorp design staff
- the contract statement of work (SOW) for all design projects completed under contract to RailCorp
- management agreements where projects are undertaken by external agencies on behalf of RailCorp.

The scope of the review process should be aligned to the nature and complexity of the project to maintain the benefits of the process without overloading low complexity projects with excessive requirements.

5.2 Project complexity

RPMM provides a *profiling and complexity tool* that enables determining the level of complexity of a project. This tool shall be used to determine the level of complexity of a project.

5.3 Technical review process

5.3.1 Technical review process — Overview

The technical review process comprises a series of reviews carried out at designated points in the development of a project. The process provides progressive evaluation of the direction and progress of the design toward meeting the design output requirements for the project.

The complete set of technical reviews that may be applicable to RailCorp projects is shown in Figure 1. Reviews applicable to a particular design shall be determined on the basis of project complexity.

Each review is shown on the diagram as taking place as a single event. While this is appropriate for smaller projects it will often be more effective for large scale, high complexity projects to hold each review as a progressive series of events and to examine individual systems or items separately. However, a final system level review should be completed where the reviews are held progressively to ensure that all interface and integration issues have been addressed.

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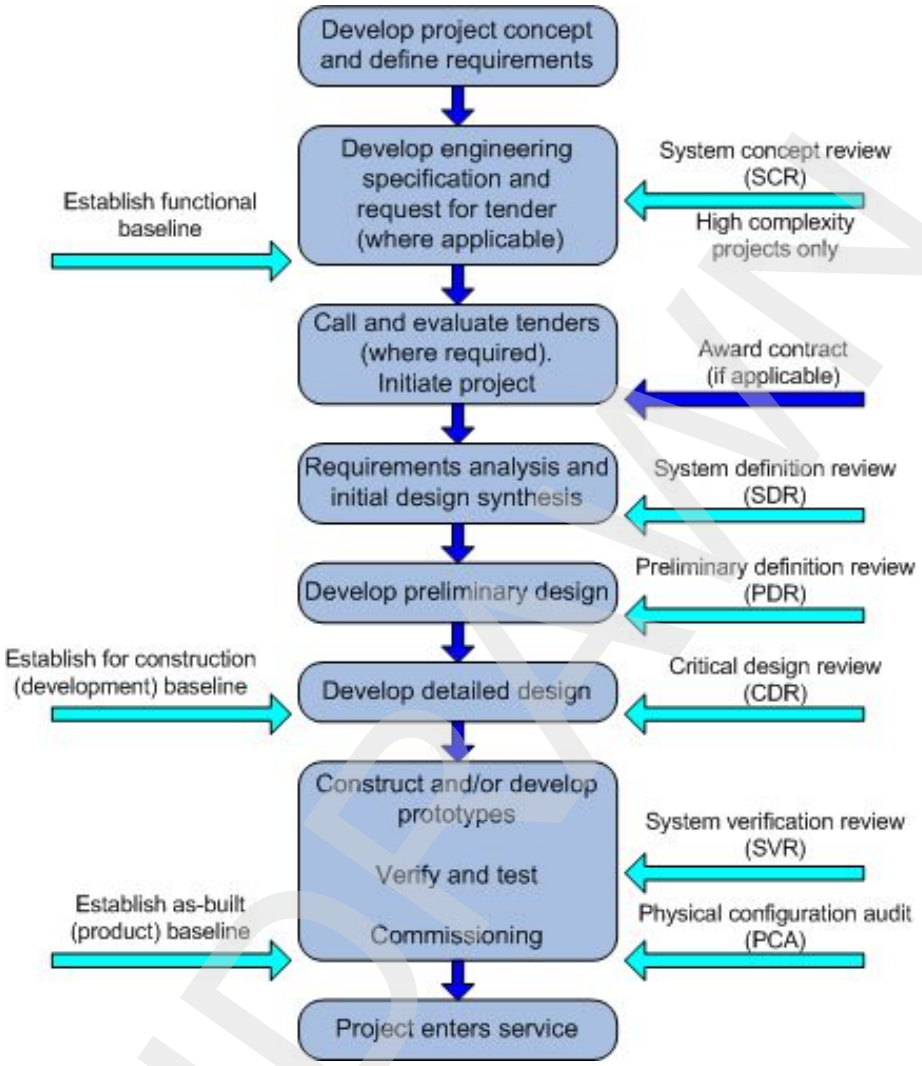

Figure 1 — Technical Review Process for RailCorp Application

5.3.2 Technical reviews – general requirements

Technical reviews should normally be conducted as formal meetings, involving the appropriate design staff and other stakeholders. This is essential to gain the widest possible range of inputs and to ensure that all relevant considerations have been taken into account.

Technical reviews should be planned and included in the project plan and project schedules. Review packages consisting of required deliverables for each review should be made available to reviewers in advance of a review meeting. The design development team should make an oral presentation at this review meeting of the applicable system requirements and the approaches, plans or designs that satisfy those requirements.

The reviews shall focus on verifying and validating that the derived technical requirements fulfil specified stakeholder requirements for a project and that the system requirements specification is continually met as the project design progresses through its development stages.

It is critical that the evaluation of assumptions and approach be carried out with reference to the requirements specified for the project. Technical reviews should not be used as a forum for reviewers to pursue personal preferences or prejudices in assessing proposed design solutions.

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The design shall be evaluated on the basis of conformity with specified requirements. Any proposal to alter the specification requirement shall be introduced by formal design change or contract change action, should the review indicate that these are not consistent with current user requirements.

Actions and comments arising from reviews shall be resolved and signed-off by relevant stakeholders before a design is accepted for use by RailCorp. Technical comments that cannot be satisfactorily resolved shall be referred to the relevant discipline heads for final determination. Other stakeholder issues that cannot be satisfactorily resolved shall be referred to the relevant CCB for final determination. The outcomes of each technical review, including actions arising from the review, shall be documented and form part of the design record for the project.

Table 1 summarises the types of technical review that may be conducted for RailCorp design projects.

REVIEW NAME	RPMM PROJECT PHASE	APPLICATION	PRIMARY PURPOSE
System concept review (SCR)	Feasibility	High complexity projects only	To consider all concepts looked at and select a preferred concept for further development.
System definition review (SDR)	Design and Planning	All projects	Ensure that specification requirements are complete and unambiguous
Preliminary design review (PDR)	Design and Planning	High complexity projects. May be combined with critical design review (CDR) for low complexity projects	Verify that preliminary approach is consistent with specified requirements
Critical design review (CDR)	Design and Planning	High complexity projects. The requirement may be met by a simplified process for low complexity projects	Verify that detail design appears to meet design intent for the project. Provides a major input for final acceptance of contract design projects
System verification review (SVR)	Build and Implementation	All projects	Verify that all testing and verification action is complete prior to final commissioning and project acceptance
Physical configuration audit (PCA)	Finalisation	All projects	Comparison of as-built configuration with design documents

Table 1 — Summary of technical review processes

The following sections outline the purpose and application of individual reviews.

Appendix A contains examples of deliverables for the milestone technical reviews for typical design projects. Specific deliverables required for reviews should be included in contract scopes of work or in management agreements for projects.

Appendix B provides an overview of the technical review process and the parties involved.

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5.4 System concept review

The system concept review (SCR) is normally only applicable for large-scale high complexity projects such as a new line or major reconfiguration of existing infrastructure. The review is carried out during the feasibility phase with the aim of selecting a preferred concept that has the potential for satisfying identified stakeholder requirements.

The review assesses progress towards converging on a viable, traceable set of system requirements that are balanced with cost, schedule and risk. The discipline heads shall take part in these reviews to ensure that the preferred concept proposal is aligned with strategic plans and directions for their respective disciplines.

5.5 System definition review

The system definition review (SDR) should be carried out as early as possible in the design and planning phase following the initial requirement analysis and allocation to ensure that the engineering (technical requirements) specification fully satisfies the system requirements for the design task.

The system definition review should demonstrate that the design development team has correctly understood the system requirements and the design intent of the acquirer. The review should confirm the convergence on and achievability of technical requirements and readiness to initiate the subsystem design phase.

5.6 Preliminary design review

The preliminary design review (PDR) is to assess whether the proposed approach for the design is consistent with the functional and performance requirements of the engineering specification.

PDRs should take place when the preliminary design has progressed to a level of detail that will allow the intended approach to be assessed for compliance with the design intent of the specification. The PDR may be conducted in one session or in several sessions to consider individual parts of the design (subsystems designs).

The review should establish that the set of assigned requirements have been met by the subsystems designs and the subsystem designs are consistent with the design intent of the acquirer.

5.7 Critical design review

The critical design review (CDR) takes place at or close to the completion of the design and planning phase. The primary purpose is to ensure that the design addresses all requirements in the engineering specification and is suitable for issue for construction or fabrication of hardware items or for coding of software.

The CDR should establish that specifications and/or drawings or software development files adequately define the subsystems, enabling systems, products and associated processes for the system to be constructed / fabricated or codified under the project and are appropriate for issue.

5.8 Technical reviews associated with build and implementation phase

The following reviews are applicable to the build and implementation phase of projects.

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5.8.1 System verification review (Operational Readiness Review)

The system verification review (SVR) covers a review of the scope and results of all tests carried out as part of the contract. The primary purpose of the SVR is to verify that performance and other requirements included in the specification have been achieved and that the project is ready for final commissioning.

The SVR takes place when all testing and validation required under the contract has been completed and results are available. It will usually include the results of pre-commissioning tests where applicable. This may not occur until very late in the project, since the hardware or software to be tested should be fully representative of the final product.

The SVR does not involve actual testing. This will have taken place beforehand and in most cases the results will have been reviewed progressively in advance of the formal SVR. The review process may include the adequacy of delivered design documents and support documents including operating and maintenance manuals.

The SVR includes review of any aspects of performance which have not been met and to establish the requirements for and timing of corrective action necessary for final acceptance of the project or product.

5.8.2 Physical configuration audit

The physical configuration audit (PCA) is an integral part of the configuration management process. It involves a validation of the “as-built” configuration of the new or altered asset with the design documentation.

PCAs provide the formal means of ensuring that the physical installation conforms to the approved design and thus the basis for formal acceptance of the project. The PCA also provides the means of formally reviewing the as-built design documentation, to ensure that it is an accurate and complete record of the physical configuration of the built asset.

PCA may be carried out progressively but shall be completed in time for the system built under the project to be commissioned and accepted.

6 Responsibilities

6.1 Project sponsor (change sponsor)

Project sponsors are responsible for

- ensuring that technical review requirements are included in the contract scope of works or management agreements between RailCorp and external agencies delivering projects for RailCorp.
- ensuring appropriate stakeholder participation in technical reviews.

6.2 Project manager

Project managers are responsible for:

- Overall project delivery
- Ensuring sponsor requirements are met throughout project delivery.

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6.3 Project design manager

Project design managers are responsible for:

- coordination of the technical reviews for RailCorp interests
- liaising with stakeholders
- resolving comments from the technical reviews
- maintaining the comments register

6.4 Discipline heads

Discipline heads are responsible for:

- participating in design reviews as required
- delegating RailCorp design staff engineering authority to undertake technical reviews
- delegating engineering authority to external independent designers to undertake technical reviews
- nominating projects and defining the scope of reviews that can be carried out by external independent designers

6.5 Technical reviewer (representing discipline head)

Technical reviewers are responsible for:

- checking that the technical requirements included in the engineering specification have been met by the design
- raising issues and concerns
- reviewing and accepting or rejecting responses to comments
- making recommendations to discipline heads on acceptability of designs for RailCorp use.

6.6 Other stakeholders

Stakeholders whose requirements have been included in a system requirement are responsible for:

- participating in technical reviews
- assigning appropriate staff to participate in technical reviews to validate their prospective requirements have been met.

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Appendix A Examples of design deliverables

Minimum levels of information necessary to conduct an effective review include:

- preliminary design and layout drawings, including interface definitions
- a summary of key assumptions made by the designer
- initial selection of major components and materials
- functional flow diagrams or equivalent for software
- the results of preliminary risk and hazard analysis
- preliminary reliability models and predictions available.

Design reports and calculations may be required in support of the review process but are not normally delivered in advance of the review.

The following tables provide examples of various deliverables based on disciplines and sub-disciplines. These are examples only and are not provided as a prescriptive or complete list of required deliverables.

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Appendix A (continued)

The following Table provides examples of design deliverables for reviews at various stages for a number of disciplines.

SDR	PDR	CDR
TRACK – refer to SPC 203		
Basic alignment framework for both horizontal and vertical alignment Horizontal curve parameters including speed, applied super and deficiency Vertical alignment should include grades, location and description of vertical curves and location of turnouts and platforms Standing room Track classification Turnout and special trackwork details Track centres (structures in “6ft”) Platform clearances and design parameters Typical cross sections indicating clearance to structures, formation profiles Location of catchpoints and buffer stops, indicating type and runoff requirements.	Horizontal and vertical alignment Earthwork cross sections for track formation Scope of works associated with trackwork construction Location of insulated joints in and around turnouts Documentation to be presented in a format suitable for approval by RailCorp’s principal design engineer, track	Horizontal and vertical alignment Earthwork cross sections for track formation Staging plans Speedboard configuration for inclusion in TOC manual

SIGNALS – refer to SPG 703 for more details		
Signalling functional specification including drivers diagram	Signalling functional specification including drivers diagram	Signalling plan Circuit design (blue) Control tables Track insulation Mechanical design (if applicable) Vital data Air systems design (if applicable) Other as per SPG 703

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SDR	PDR	CDR
ELECTRICAL – mains – overhead wiring		
Tension length diagram showing wire runs, anchor locations and calculated tension losses Proposed sectioning diagram. (The designer shall liaise with relevant stakeholders, through the RailCorp Project design manager, to produce a proposed sectioning diagram. RailCorp Project design manager is responsible for obtaining relevant approvals for the proposed section diagram) Overhead wiring conductor system Scope of modifications to existing OHW Interface issues	Preliminary risk and hazard analysis Preliminary layout drawing with setout of overhead wiring structures Preliminary Profile drawings, if applicable Proposed modifications to any existing overhead wiring and structures Loading diagrams Drop vertical lengths and positions Requirements for waivers and type approval of non-standard equipment/materials Scope of interface activities and the design packages under which such activities are covered.	Final risk and hazard analysis For construction layout drawings For construction Profile drawings, if required Switch arrangement drawings, if required Overline bridge fitting arrangement drawing, if required Overline bridge bonding arrangement drawing, if applicable Overhead wiring support and registration arrangements – CCALC output sheets and, if required, cross sections. Details of dropper lengths and spacings Overhead wiring structures bonding requirements Feeding arrangement drawings, if required Temperature / tension charts or tables, if required Details of modifications to existing OHW and structures Approved waivers, if applicable Type approvals, if applicable Status of design of interface requirements
ELECTRICAL – traction supply upgrade		
Design management plan including provisions for interface management Design brief Physical boundaries of the project (feeders, OHW, substation earthing, signals) Survey scope details Geotechnical scope details Environmental scope details/issues Design methodology/strategy System/project interfaces	Preliminary design and layouts drawings, including interface definitions A summary of key assumptions made by the designer Initial selection of major components and materials The results of preliminary risk, hazard and human factors analysis Preliminary reliability models and predictions available Design reports and calculations	Detailed drawings and supporting design information (design report and technical specification) Safety and hazard analysis Final reliability models and predictions for the design

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SDR	PDR	CDR
ELECTRICAL – power systems – earthing		
Site Investigation and Hazard Assessment Soil Earth Resistivity Measurement Soil Earth Resistivity Modelling AC fault level calculation 1500 VDC fault level calculation Specific Electrolysis Issues 1500 V Bonding Requirements Design Targets	Fault Current Modelling and Distribution EPR calculation Step and Touch Voltage calculation Electrolysis Mitigation measures Bonding/Insulation Requirements	Analysis of Transferred EPR Critical Earthing Design Report Construction Drawings and Information Final Earthing Design Report
ELECTRICAL – power systems – protection		
HV operating diagrams	Concept protection scheme design Voltage / current transformer sizing System staging design Protection equipment selection	Schematic diagrams SCADA alarms and interface design Final design report

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SDR	PDR	CDR
ELECTRICAL – mains – HV aerial lines and cables		
Proposed HV operating diagrams. (The designer shall liaise with relevant stakeholders, through the RailCorp Project design manager, to produce a proposed diagram. RailCorp Project design manager is responsible for obtaining relevant approvals for the proposed diagram.) Conductors/cables specification Concept solutions on the optimal feeder route Scope of modifications to existing HV feeders Requirements for easements and approvals by external bodies Interface issues	Proposed pole locations and/or cable routes Preliminary layout and profile drawings Preliminary risk and hazard analysis Requirements for waivers and type approval of non-standard equipment/materials Details of proposed easements and associated approval requirements Scope of interface activities and the design packages under which such activities are covered. Appropriate Environmental Reports for the feeder route	Final risk and hazard analysis Final Environmental Reports Layout drawings showing: HV Aerial line details in accordance with the requirements set out in RailCorp Standard EP 10 01 00 06 SP Details of cable route with appropriate cross sections and details along the entire cable route to show the details of the cable route HV Aerial line profiles in accordance with the requirements set out in RailCorp Standard EP 10 01 00 06 SP Temperature/tension or sag charts/tables Details of easements and approvals Details of modifications to existing HV Feeders and supporting structures Approved waivers, if applicable Type approvals, if applicable Status of design of interface requirements Supporting calculations to confirm: Strength of poles and crossarms Adequacy of overhead earthwire shielding angle Clearances Adequacy of cable ratings Adequacy of cable support and clamping arrangements for single core cables

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SDR	PDR	CDR
ELECTRICAL – distribution – HV and LV power distribution		
Detailed site inspection report Fully dimensioned site plan Single line diagram and operating diagram Max demand calculations for each load Design studies: fault level, voltage drop, cable sizing calculation etc. Cable route diagrams with pit locations Supply sources SCADA design Equipment sizes such as transformers, switchgear, protection, cables, battery/chargers, UPS etc as may be required Other discipline interfaces, such as signals, O/H wiring, buildings etc. Confirmation of conformance to Australian Standards, RailCorp and Statutory requirements Cost benefit analysis of options and final selection	All outstanding issues from SDR stage addressed Other services interface schedule Designer's risk assessment and traceability Final design studies such as fault level, voltage drop, cable sizing to be complete and confirmed SCADA design and implementation Cable selection, cable schedule and cable routing fully designed along with trenching and/or ducting arrangements Fully dimensioned and confirmed site plan Complete protection schematics Protection relay coordination and setting calculations Complete detailed design confirmed and frozen Provide test and commissioning plan Provide a detailed bill of material covering all items required for construction with recommended sources of supply Provide specification for any item not covered in RailCorp standards Provide switchboard, equipment GA drawings	SCADA Alarms and Interface Design Construction Drawings and Information and final Design Report

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SDR	PDR	CDR
CIVIL		
Environmental report Risk report Investigation report including recommended option Drawings defining agreed concept Relevant supporting reports such as geotechnical, hydrology/hydraulic, survey Preliminary track, road alignment drawings Design criteria report Preliminary detailed drawings (generally all anticipated project drawings developed to 30% complete)	Draft technical specification Preliminary detailed drawings (generally all anticipated project drawings developed to 70% complete) Updated risk report Draft manual detailing maintenance and operational requirements and procedures	Technical specification – complete Detailed drawings – all developed to 100% complete Updated risk report – complete Manual detailing maintenance and operational requirements and procedures – complete Detailed design report

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SDR	PDR	CDR
TELECOMMUNICATIONS		
System Level Schematics Network Schematics Preliminary Loss budgets Spare port and cable allocation checks Material and equipment availability Software identification Typical Environmental limits Typical Floor Plan Changes to Power and Air-conditioning loads Concept timing diagrams Typical radio coverage Concept Design Updated Hazards and Risk Analysis	Details of design for CCR purposes Final System Level and Network Schematics Detailed Equipment lists Plant and Equipment to be De-commissioned (if applicable) Rack Layout and Distributor Diagrams Final Port and Cable allocations Approved Floor Plan Final Loss Budgets Software and accompanying documentation Software development and configuration management procedures Availability Calculations IP addresses Message formats Environmental limits Floor loads Heat dissipation and Air-conditioning loads Timing diagrams Test and Inspection Plans RATM (Update) Hazards and Risk Analysis (Update) FMECA Detailed Design Final Hazards and Risk Analysis Test Specifications Final CCR design details Technical Maintenance Plan Verified Detailed Design	Approved Detailed Design

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SDR	PDR	CDR
STATIONS AND BUILDINGS		
Building form, fenestration and space at 1:100 scale All spatial elements defined External materials and finishes nominated Preliminary design of all services and structural systems adequate to define special requirements Preliminary assessment of compliance, Fire Engineering Brief if necessary All physical elements designed and sized at a concept level Passenger circulation studies including consideration of emergency scenarios and incorporation of all necessary spaces into design Estimate of demand loads for power Preliminary cost estimate Completed quality checklists and certification appropriate to the stage (for all disciplines) Appropriate level of Environmental and Heritage Impact Assessment as necessary for formal assessment Artist's impression and 3D computer generated walk through as appropriate Incorporation of all stakeholder requirements	Design parameters to the level of specific detailed requirements and all structure, services and construction materials and methods required to achieve them Preliminary details to explore materials and construction options and methods within a defined building and spatial form, envelope, fenestration and outline 1:50 section elevation preliminary details Detailed cost estimates Material specifications, fixing and assembly instructions method and finishes schedule Services and structural design to quantified and detailed level, indicating equipment, distribution and outlet sizing, routing and location Outline descriptive specification of all building elements and sub elements Outline construction and operational methodologies required or implied by the specification including buildability, maintenance, staff and public operational implications and recommendations for staging, temporary works, possessions and operational changes Preliminary schedules for: internal and external colours and finishes, proprietary fixtures, fittings and hardware, door schedule Detailed sub element cost analysis of the developed design within budget Completed quality checklists and certification appropriate to the stage (for all disciplines) Coordination and integration of detailed stakeholder requirements	Documents, in detail, of all aspects of the developed design for the purposes of detailed pricing and construction Constructable design document, taking into account all required staging, site access and operational parameters; Nominated storage and material handling areas for each site Architectural documentation including general arrangement drawings – 1:100; coordination/site plan(s) setting out points – 1:100 or 1:200; temporary works and staging plans – 1:100; demolition plans – 1:100; roof plan –1:100 Sections and elevations – 1:100 Details of layouts, plans and elevations – 1:50; reflected Ceiling plan – 1:100 including FFandE and service outlets coordinated Construction and finishes details – 1:20 or larger Signage plan, landscaping plan and details Detailed specification Schedules including door schedule, finishes schedule, colour schedule (including colour and finishes board). Station painting and colour scheme in accordance with CityRail's Final detailed construction estimates based on documents Corporate Identity: Colour Scheme Manual All appropriate and complementary structure and services details drawings and specifications as required all fully coordinated Completed quality checklists and certifications of compliance with RailCorp Standards, all statutory requirements, stakeholder requirements. Note Building Code of Australia (BCA) Certification by a registered BCA certifier is required.

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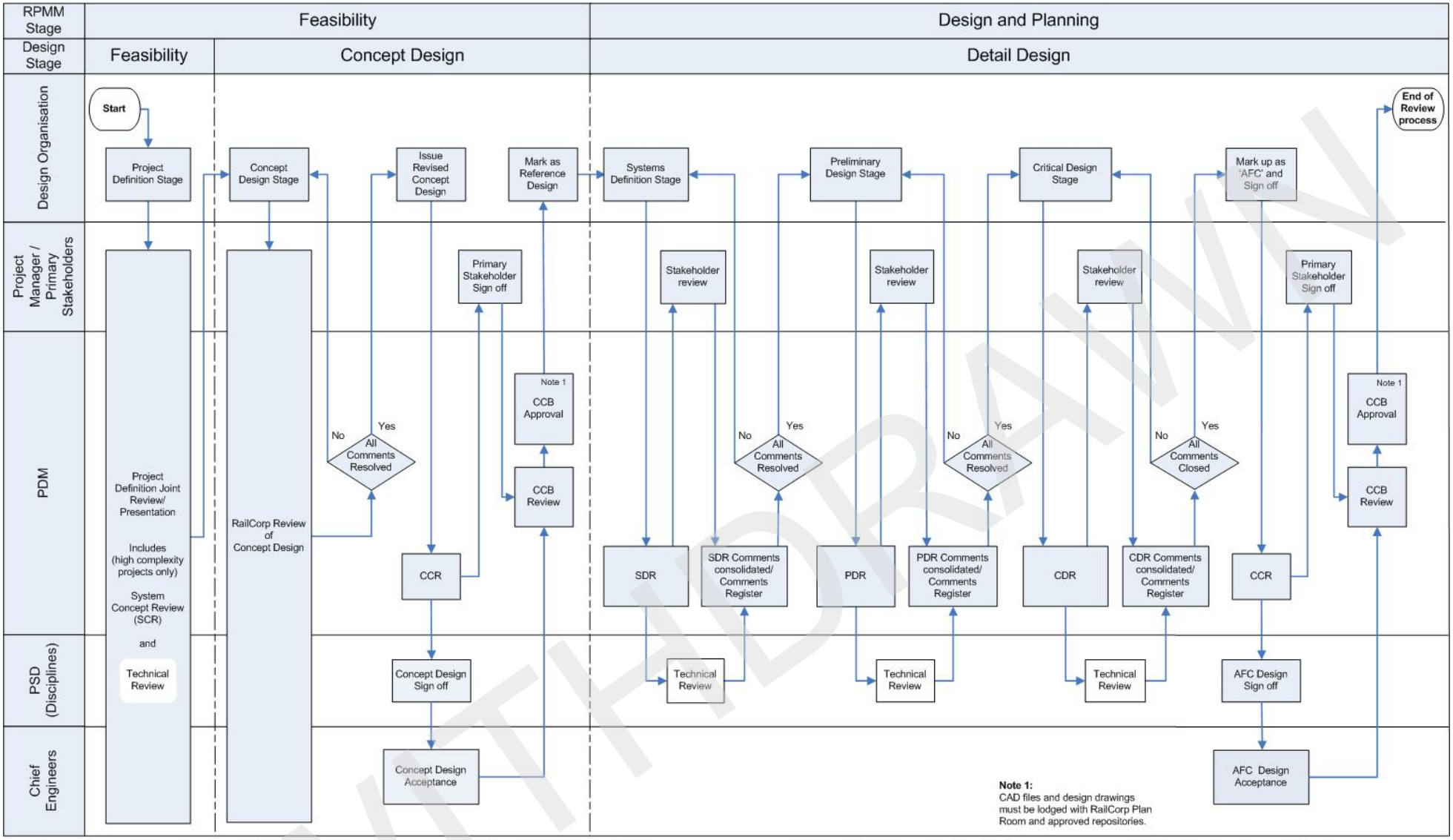
Appendix B Flowchart of processes at the feasibility and design stages



Legend:
AFC Approved For Construction
CCB Configuration Control Board
CCR Configuration Change Request
CDR Critical Design Review
PDM Project Design Manager
PDR Preliminary Design Review
PSD Professional Services Division
SCR System Concept Review
SDR System Definition Review

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