

Engineering Manual

General

CRN GM 001

ENGINEERING STANDARDS SYSTEM MANUAL

Version 1.3

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Document control

Revision	Date of Approval	Summary of change
1.0	December, 2011	First Issue
1.1	October, 2015	Various - Changed title "Asset Management and Engineering Services Manager" to "Manager Engineering Services", Added "Plant" to Rolling Stock discipline, 3.4 - Changed CRIA to CRC, 5.4.2 - Removed "Exceptions" as a form of waiver; Removed "Other TMPs" and "CAD manual" from numbering system, 5.4.3 - Deleted CRN GM 005 – listing not required; Added CRN GM 006 – Engineering Waivers, 5.4.4 - Changed reference to standards listing to CRN website, 6.8 - Removed organisational location of compliance function, 6.12 - Updated waiver requirements to match CRN GM 006. Added reference to CRN GM 006
1.2	February, 2017	6.11 - Corrected document reference from CRN SMS NE RLS 0013 to CRN-FRA-RLS-015 Risk Management Framework.
1.3	August, 2020	See Summary of changes below

Summary of changes from previous version

Section	Summary of change
Title	Update JHR Logo
3.4	Included definition of Engineering Standards, Standards, Manuals, Specifications and Technical Notes for clarity
5.4.1	Changed reference to Buildings to Facilities to reflect current terminology

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1 Scope and application

This manual explains the context of and provides an introduction to the John Holland Rail Country Regional Network (CRN) Engineering Standards, including associated documents such as engineering manuals and engineering specifications.

The manual outlines the architecture for the suite of engineering standards which are used for the design, installation, maintenance and operation of the CRN.

The suite of engineering standards is applicable to;

- infrastructure assets designed for and installed on the CRN, including associated assets, subject to the John Holland Rail (JHR) CRN Management Contract and its associated rail safety accreditation; and
- rolling stock, plant and equipment assets utilised on or for the CRN.

The suite of engineering standards covers only the engineering requirements for the above assets. In addition to the engineering requirements, JHR CRN will need to comply with other regulatory and contract requirements for the overall protection, operation and safe use of the assets.

2 Introduction

Infrastructure assets of the CRN are made up of;

- civil infrastructure, consisting of track, structures, buildings and right of way assets;
- signal, communications, and train control assets, including asset systems hardware and software; and
- electrical infrastructure.

Rolling stock, plant and equipment assets, relevant to the suite of engineering standards documents, are made up of;

- rolling stock and on-track plant and equipment that may operate on CRN track; and
- other plant and equipment that may be utilised for the design, fabrication, construction, installation, maintenance, disposal or operation of CRN infrastructure assets;

3 References

3.1 Australian and International Standards

AS 4292 (all parts) Railway Safety Management

Engineering Safety Management (The Yellow Book) Volumes 1 & 2, Fundamentals and Guidance, Issue 4, Rail Safety Standards Board, United Kingdom, 2007

3.2 JHR CRN Documents

JHR CRN Safety Management System

CRN Asset Management System Manual

3.3 Other references

Country Regional Network Operations and Maintenance Deed between John Holland Rail Pty Ltd and Country Rail Infrastructure Authority, executed on 16 December 2010

NSW Country Regional Network Scope of Work and Technical Criteria, V1.0

3.4 Common abbreviations and definitions

CRC	Country Rail Contracts, owner of the Country Regional Network
JHR	John Holland Rail Pty Ltd
CRN	Country Regional Network
JHR CRN	The organisation, within John Holland Rail, responsible for the management of the CRN
Engineering Standards	A collective term for the entire suite of available engineering documents for the design, construction, inspection and maintenance of the railway, which entail Standards, Manuals, Specifications and Technical Notes
Standard	A document addressed primarily to Designers and Asset Managers, which establish the functional and design requirements, approved configuration, acceptance standards
Manual	A document addressed primarily to persons undertaking field activities, which detail the technical procedures for the installation, inspection and maintenance of assets, including the competency and management requirements as well as maintenance limits and responses
Specification	A document addressed primarily to persons undertaking procurement of products and materials, which detail acceptance requirements or processes during the procurement or as a model for specifications for works.
Technical Note	A document produced for a specific defined audience to provide a controlled means of communicating technical issues to those undertaking activities on the relevant infrastructure. They may also provide interim changes to standards, manuals, or specification, and typically have a defined life.

4 Engineering standards policy, objectives and requirement

4.1 Policy

The engineering standards are developed to meet the applicable requirements of the following JHR CRN policies:

- Rail Safety
- Health and Safety
- Environment
- Quality
- Asset Management

The above policies are available for review on the JHR CRN website.

4.2 Objectives

The objectives for engineering standards management are to;

1. provide an engineering standards framework for delivery of the intent of JHR CRN policies;
2. meet the requirements for engineering standards set by the JHR CRN Safety Management System; and

3. meet the objectives and requirements of the JHR CRN Asset Management System, including the role of engineering standards, specifications and manual in the applicable asset management model.

4.3 Requirement for engineering standards

The core requirement for engineering standards for the CRN is called up by Clause 16 of Schedule 1 of the NSW Rail Safety (General) Regulation 2008:

“16 General engineering and operational systems safety requirements

- (1) *A documented set of engineering standards and procedures, and operational systems and safety standards and procedures, to cover the following and, if relevant, the interface between any 2 or more of them:*
 - (a) *rail infrastructure,*
 - (b) *rolling stock,*
 - (c) *operational systems.*
- (2) *Details of the implementation and procedures for updating the documents specified in subclause (1).*
- (3) *Procedures for the control and verification of the design of structures, rolling stock, equipment and systems, in accordance with the engineering standards and procedures, and operational systems and safety standards, specified in subclause (1).*
- (4) *Systems, standards and procedures for the following in relation to rail infrastructure and rolling stock:*
 - (a) *engineering design,*
 - (b) *construction and installation,*
 - (c) *implementation and commissioning,*
 - (d) *system operation,*
 - (e) *monitoring and maintenance,*
 - (f) *modification,*
 - (g) *decommissioning or disposal.”*

The engineering standards documents principally cover the Clause 16 requirements above for “*engineering standards and procedures*”. Requirements for “*operational systems and safety standards and procedures*” are principally covered by other JHR CRN documents.

5 The architecture

5.1 Architecture principles

The structure of the engineering standards documents has been developed with the following principles in mind:

1. The structure of the standards considers the context of the CRN within the overall management of the NSW and interstate rail network.
2. The structure and content of the standards considers the degree of transferability of rolling stock and infrastructure works supplier resources between different NSW network management areas.
3. The structure and content of the standards considers the scope and scale of the CRN network.
4. The structure of the standards documents maintains a degree of discipline breakdown commonality with other principal NSW infrastructure managers and network operators.

5. The structure of the standards also maintains a degree of discipline breakdown commonality with the standards applicable to the CRN at the time of transfer of the CRN network to John Holland.
6. All standards documents are pre-fixed with “CRN” to distinguish them from the standards of the other principal NSW infrastructure managers and network operators.
7. The hierarchy of nomenclature within the standards numbering system is:
 - a. Organisation (i.e. “CRN”)
 - b. Discipline (e.g. “C” for civil)
 - c. Type of Document (e.g. “S” for standard and “M” for manual)
 - d. Unique 3 digit number for a standards document within a discipline (e.g. “001” for the highest level document within a discipline)
 - e.g. “CRN CS 200” for the Civil Standard “Track System”

5.2 Engineering Standards and Related Documents

Engineering standards documents generally comprise the following:

- a. Standards
- b. Manuals
- c. Specifications
- d. Associated documents, called up by the above, which may include forms, templates, data collections, standard drawings, type approved equipment lists, engineering waivers and concessions, and technical notes.

Within the engineering disciplines of the JHR CRN, including civil, signalling and rolling stock, there are some variations as to how documents are classified as “Standards”, “Manuals” or “Specifications” due to historical industry practice within the discipline. Additionally, the word “Standards” may sometimes refer generically to all standards documents. This variation is retained in the JHR CRN standards for consistency across disciplines within the NSW rail industry.

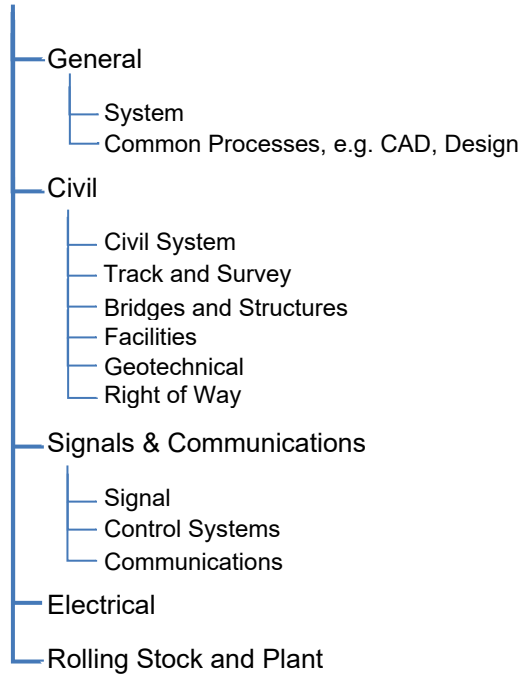
5.3 Scope of Engineering Standards Coverage

The scope of engineering standards coverage is specified in CRN Engineering Manual CRN GM 003.

5.4 Breakdown Structure and Numbering System

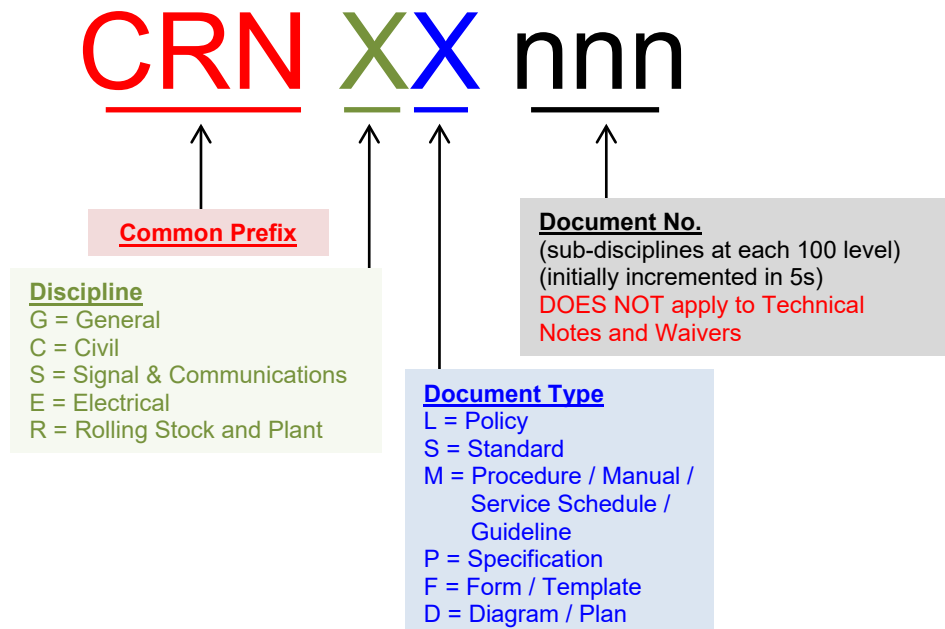
5.4.1 Structure of Standards

Technical Standards and Systems

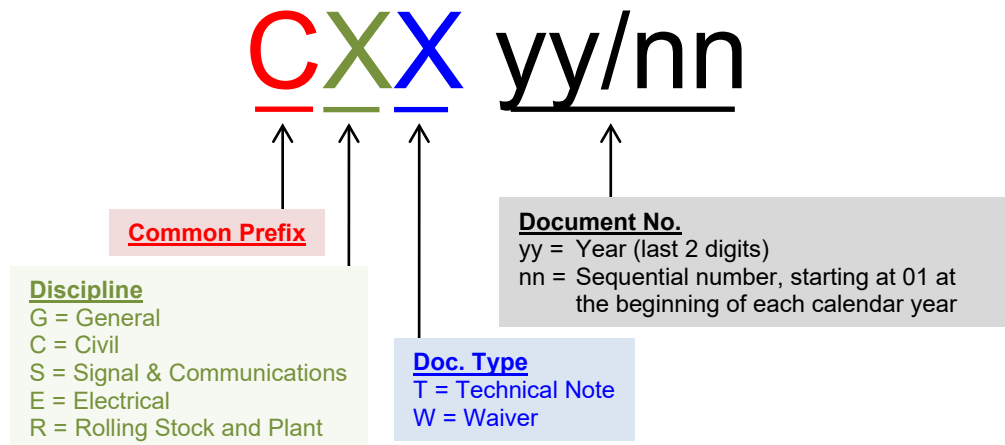


5.4.2 Numbering System

Documents are numbered as shown below. Every stand alone document within a different type of document shall have a unique document number.



General Document numbering convention (Note: Doc. Types may vary between disciplines.)



Document numbering convention for Technical Notes and Waivers

Document Type	Number	Example
Engineering Standard	CRN xS nnn	CRN CS 200
Engineering Specification	CRN xP nnn	CRN CP 101
Engineering Manual	CRN xM nnn	CRN CM 321
TOC Manual		
Technical Notes	CxT yy/nn	CCT 11/11
Engineering Waivers	CxW yy/nn	CCW 11/02
Civil TMPs		CRN SC 100

5.4.3 General Standards

The suite of manuals that is applicable to all CRN disciplines include;

- CRN GM 001 Engineering Standards System Manual
- CRN GM 002 Engineering Standards Development Manual
- CRN GM 003 Engineering Standards Scope of Coverage
- CRN GM 004 Writing Requirements and Guidelines for Engineering Standards
- CRN GM 006 Engineering Waivers

and any other approved standards with the prefix “CRN GM...”

5.4.4 Civil, Signal, Electrical, Plant and Rolling Stock Standards

All approved discipline specific standards are listed on the CRN standards website.

6 Application of engineering standards

6.1 Relevant personnel

The requirements of JHR CRN Engineering Standards shall be applied by personnel carrying out activities involving;

- CRN infrastructure design, provision, installation, construction, commissioning, maintenance, decommissioning and disposal;

- Provision, commissioning and maintenance of rolling stock and vehicles or on-track equipment that may operate on CRN tracks;
- Provision, commissioning and maintenance of plant and equipment that may be utilised for the design, fabrication, construction, installation, commissioning, maintenance, disposal or operation of CRN infrastructure assets or associated rolling stock;
- CRN asset management and procurement;
- CRN standards development and management; and
- CRN management and operational decision making relevant to engineering standards.

All such personnel shall hold the required competency certification, licences and authorities required by the engineering standards documents to carry out the above activities.

6.2 Currency and understanding

All personnel undertaking the activities listed in Section 6.1 shall ensure that the relevant standards documents being utilised are the current approved documents from the CRN standards website and that they are fully aware of the requirements of the standards documents for the activities they are undertaking.

6.3 Engineering standards interpretation and precedence

Engineering standards are developed to cover the scope of engineering activities of the JHR CRN within the normal anticipated range of context situations of those activities on the CRN. Personnel carrying out engineering activities on JHR CRN assets or associated rolling stock are to apply appropriate risk management to the activities, including consideration of whether the particular context of the activity is within the scope and coverage of the engineering standards. Context conditions outside the specific coverage of the engineering standards may include particular local or site conditions, unusual activities, or matters outside the specific coverage of the engineering standards called up within CRN GM 003 Engineering Standards Scope of Coverage.

Additionally, where there are conflicts in the requirements of JHR CRN Engineering Standards and other Australian or International Standards the more stringent requirement shall be applied.

Wherever there are issues associated with the application of engineering standards to JHR CRN activities, including potential context situations outside the standards coverage, conflicts or ambiguities in standards provisions, the person responsible for the activity shall refer the matter to the relevant JHR CRN Principal Engineer for consideration.

6.4 Principal Engineers and engineering standards management

JHR CRN Principal Engineers are appointed to cover the engineering disciplines of track, structures, right of way, geotechnical, signal, communications, control systems, electrical, plant and rolling stock. Each appointed Principal Engineer has the highest level of authority and accountability for JHR CRN engineering standards management within their relevant discipline.

The Principal Engineers form a committee to cover the development and approval of the General Engineering Standards Documents.

The Principal Engineers report to the Manager Engineering Services. The Manager Engineering Services authorises engineering standards documents and has the highest level of authority and accountability for JHR CRN standards management processes.

The Manager Engineering Services, together with the Principal Engineers and other senior JHR CRN managers with a stakeholder interest in engineering standards, form an Engineering Standards Configuration Committee which oversees engineering standards management on the CRN.

The processes of engineering standards development and management, including the charter of the Engineering Standards Configuration Committee are covered in CRN GM 002 Engineering Standards Development Manual.

6.5 Competency Requirements

Specific competency requirements are specified within the engineering standards documents of each relevant discipline for personnel undertaking the activities listed in Section 6.1 above. This covers all Rail Safety Work, as defined in the NSW Rail Safety Act 2008, relevant to engineering standards.

Discipline (s)	Relevant Engineering Standards Document for Competency Requirements
Civil (including track, structures, right of way, geotechnical)	CRN CM 001 – Civil Technical Competencies and Engineering Authority
Signal, Communications and Control Systems	CRN ST 001 - Reassessment of Signalling Infrastructure Workers CRN ST 002 - Assessment of Signalling Infrastructure Workers – Licence to Practice
Rolling Stock	Competency requirements are covered by the accreditation requirements of the relevant operator, including the JHR Plant Manager for internal JHR on-track plant
Electrical	Competency requirements are covered by the licensing of supply authorities

In addition to the discipline specific competency requirements other general engineering standards competency requirements are specified as follows:

Activity	Reference Documents
Standards development and management, including technical management	CRN GM 002 Engineering Standards Development Manual
Design Management	CRN Engineering Management Procedures
Infrastructure Works Management	CRN Infrastructure Management Procedures

JHR CRN is committed to the use of National Competency Standards. The units of competency are listed in the JHR CRN Enterprise Bargaining Agreement (EBA) and are, for the most part, national units of competency. In cases where no appropriate national unit of competency exists, or where the national unit of competency does not adequately reflect the skills required in JHR CRN, specific JHR CRN competencies are developed.

The Principal Engineers authorise the use of specific National Competency Standards for JHR CRN activities, or where it is determined that National Competency standards do not adequately reflect the skill set required for an activity, they authorise a JHR CRN Competency Standard. In doing so the Principal Engineers satisfies themselves that a person who has the specific competency will be able to do the work to the desired level of proficiency.

JHR CRN will be active participants in forums and committees that develop and review National competencies in areas of relevance to JHR CRN.

Where competencies are required to carry out specific defined roles in the JHR CRN organisation structure, the competencies shall be included in the position descriptions for the defined role.

Principal Engineers shall oversight the acceptance of competency requirements through the recruitment or engagement of relevant personnel.

6.6 Engineering licensing and authority

Over and above the requirements for competency certain critical engineering activities require specific licensing of personnel. These requirements are referenced within the following relevant discipline specific engineering standards as follows:

Discipline (s)	Relevant Engineering Standards Document for Engineering Licensing
Civil (including track, structures, right of way, geotechnical)	CRN CM 001 – Civil Technical Competencies and Engineering Authority
Signal	CRN ST 002 - Assessment of Signalling Infrastructure Workers – Licence to Practice

The system of licensing, including maintenance of records is managed within each discipline by the Principal Engineer.

All engineering decision making activities on the CRN which may affect the safety risk profile of infrastructure or operations shall be carried out by a person with appropriate engineering authority.

These decision making activities include;

- engineering design of infrastructure;
- inspection and testing of infrastructure;
- certification of infrastructure, including commissioning certification;
- configuration change design and approvals, including variation of operating requirements or restrictions; and
- engineering standards changes, concessions and waivers.

Engineering authority is delegated to JHR CRN from the JHR Board and Chief Executive officer to the Manager Engineering Services with the overall accountability for the standards management process.

The Manager Engineering Services is authorised to further delegate discipline specific engineering authority to the Principal Engineers. The Principal Engineers further delegate to discipline lead personnel carrying out infrastructure works, who may in turn delegate authority to particular supervisors and personnel. The process of delegating engineering authority within each discipline is specified within the discipline standards documents as follows:

Discipline (s)	Relevant Engineering Standards Document for Engineering Authority
Civil (including track, structures, right of way, geotechnical)	CRN CM 001 – Civil Technical Competencies and Engineering Authority
Signal	CRN ST 002 - Assessment of Signalling Infrastructure Workers – Licence to Practice

General engineering authority is delegated by the Manager Engineering Services as specified in the following engineering standards documents:

Activity	Reference Documents
Standards development and management, including technical management	CRN GM 002 Engineering Standards Development Manual
Design Management	CRN Design Management Procedures
Infrastructure Works Management	CRN Infrastructure Management Procedures

The delegation of engineering authority is only to individuals and is subject to the individual holding the required competency and / or licensing requirements. The authority to further delegate shall be specified within each delegated authority.

6.7 Verification, validation, certification and / or approval

All changes to CRN assets or rolling stock which may affect the safety of CRN assets or operations shall be subject to verification during both design and implementation of the changes. Specific requirements for verification are set out in JHR CRN discipline standards and in the JHR CRN engineering management procedures.

Where changes to the use or operation of CRN assets or rolling stock may affect the safety of CRN assets or operations, the changes shall be subject to validation of the changes. Specific requirements for validation are set out in JHR CRN discipline standards and in the JHR CRN engineering management procedures.

All proposed changes subject to verification or validation shall be certified and approved for implementation by persons with appropriate engineering authority.

6.8 Compliance and audit

The engineering standards documents include requirements for extensive processes of inspection and testing for assurance of compliance of CRN assets to engineering standards. The JHR CRN Infrastructure Manager is responsible for implementing these processes.

In addition to these processes a separate compliance function is established to audit compliance on a sampling basis.

6.9 Management of non-compliance

Management processes shall be established to manage potential and actual non-compliance of assets to engineering standards. These processes include:

- Defects Management System
- Risk based processes for granting permanent standards exemptions or concessions
- Risk based processes for granting standards waivers for defined time periods

6.10 Change and configuration management

JHR CRN is required to have in place procedures for ensuring changes which may affect the safety of rail operations are identified and managed.

Relevant to this requirement include changes to:

- assets due to infrastructure maintenance or works activities
- engineering standards
- Rolling stock
- Operating requirements, including the requirements of the TOC Manual

Where there is a potential for change to affect the safety of rail operations, the change is to be managed in accordance with the JHR CRN Change Management Plan, contained within Element 10 of the JHR CRN Safety Management System.

6.11 Application of risk management to engineering standards

Personnel carrying out engineering activities on JHR CRN assets or associated rolling stock shall apply appropriate risk management to the activities in accordance with the requirements of the CRN Safety Management System Document CRN-FRA-RLS-015 Risk Management Framework. The requirements for risk management are addressed through the engineering standards in the following ways:

1. The engineering standards provide controls to specific hazards or risk contributory factors identified in the JHR CRN Principal Risk Register. The required engineering standards functional areas for application of these controls are identified in the Principal Risk Register. The Principal Engineers are responsible for assuring the detailed implementation of these controls within the provisions of the engineering standards.
2. The processes for development and management of the engineering standards include risk assessment of changes to engineering standards. The requirements for this are set out in CRN GM 002 Engineering Standards Development Manual.
3. The engineering standards specify particular risk processes for engineering activities carried out on CRN assets and the associated rolling stock.
4. The engineering standards function of the JHR CRN management is a contributory stakeholder of the Principal Risk Register, with the Principal Engineers providing feedback information to the Principal Risk Register on engineering activities and the effectiveness of controls.

6.12 Engineering standards waivers

Where personnel carrying out engineering activities consider that the provisions of the engineering standards are not appropriate or too stringent for the particular activity to be undertaken, they may refer the matter to the appropriate Principal Engineer.

The Principal Engineer may grant a waiver to the engineering standards. Waivers may be either permanent variations to the requirements of the engineering standards (also known as

concessions), or temporary variations to apply for a specified time period. Waivers must meet the requirements specified in CRN GM 006 “Engineering Waivers”.

Permanent waivers are only applied to particular instances of the engineering activity or to particular assets and not generally across the CRN. If permanent waivers are requested for general application across the CRN, they are to be managed as proposed standards changes, in which case a temporary waiver may be issued until the standards changes are published.

6.13 Communications

The Principal Engineers shall establish processes for communication of and consultation on engineering standards matters with internal and external engineering standards stakeholders.

These processes may include briefings of relevant personnel on engineering standards changes and updates on relevant industry information and experience.

6.14 Records of engineering standards application

The following records of engineering standards application shall be maintained within the JHR CRN documentation or asset management systems:

- Competencies of personnel
- Delegation of engineering authorities
- Configuration change and design documentation, including works as executed drawings
- Certification activities, including verification, validation, approval and authorisation, covering standards changes, design, configuration change, asset and rolling stock certification
- Granting of concessions and waivers
- Defects and non-compliance, including records of rectification
- Changes to engineering standards
- Risk assessments
- Audits

7 Engineering standards interfaces

Engineering standards provide support to and contain requirements for many functional areas of JHR CRN. This section of the Engineering Standards System Manual contains guidance on the interfaces between the engineering standards and key functional activities of JHR CRN.

7.1 CRN infrastructure asset management

For managers undertaking asset management activities:

- A. the engineering standards provide;
 1. specific standards to which the assets are to comply and against which non-compliance and defects can be identified; and
 2. baseline standards requirements, against which the performance of assets can be assessed
- B. and the managers shall;
 1. incorporate standards requirement into the overall asset management system; and
 2. prepare annual works plans for the short term and long term assurance of compliance.

7.2 Infrastructure maintenance, works and infrastructure operations

For maintenance managers and managers of works on the CRN assets, including managers of third party works:

- A. the engineering standards provide;
 - 1. specific engineering requirements for the works.
- B. and the managers shall;
 - 1. assure that assets comply with the requirements of the engineering standards.

7.3 Network, train and on-track equipment operations

For operating managers of the CRN Network and operating managers of trains and on-track equipment on CRN tracks:

- A. the engineering standards provide;
 - 1. The Train Operating Conditions (TOC) manual; and
 - 2. Rolling stock standards.
- B. and the managers shall;
 - 1. operate the CRN networks and trains within the requirements of the TOC Manual; and
 - 2. assure that rolling stock and on-track equipment operating on CRN tracks complies with the rolling stock standards.

7.4 Safety and environmental management

For managers of the safety and environment function of JHR CRN:

- A. the engineering standards provide;
 - 1. assurance of engineering standards support to the requirements of rail safety accreditation through compliance to the Safety Management System;
 - 2. inputs to the Principal Risk Register; and
 - 3. engineering standards controls to particular hazards and risk contributory factors in the Principal Risk Register.
- B. and the managers shall;
 - 1. manage the stakeholder interface with engineering standards by communicating changes to requirements and the Principal Risk Register.

7.5 Human resources and training

For managers of the human resources and training function of JHR CRN:

- A. the engineering standards provide;
 - 1. competency requirements for personnel undertaking engineering activities;
 - 2. a frameworks for licensing and authorising personnel to undertake engineering activities; and
 - 3. training manuals and requirements.
- B. and the managers shall;
 - 1. establish and maintain processes to assure recruited and or appointed personnel have the required competencies;
 - 2. establish and maintain personnel records management, including personnel registers of competencies, engineering licences and authorities; and
 - 3. manage training of infrastructure and asset management personnel in the application of the engineering standards
 - 4. establish and maintain processes to assess the continuing competencies of personnel.

8 Engineering standards improvement framework

8.1 Engineering standards review and change

The JH CRN Engineering Standards are subject to review and change as part of the processes of asset management and continuous improvement. Changes may be instigated by a number of factors including:

- changes in the business or operations of the CRN
- changes to the CRN extent or physical configuration
- changes to CRN business and operational configurations, including changes to the JH CRN Safety Management System, management structure or business and operational systems
- developing experience in the application of engineering standards to CRN assets and operations
- identified areas of asset or operational performance that could be improved by change to the standards
- improved standards controls in the management of risk
- changes in the regulatory framework under which the CRN operates
- changes in technology
- external changes, including changes to standards of interfacing organisations and wider industry standards
- developments in rail industry knowledge and experience

All users of CRN Engineering Standards have an obligation to identify and report on issues which may arise in the application of standards and to make suggestions for improvements to the engineering standards.

8.2 Identifying engineering standards issues and opportunities for improvement

The processes for identifying and reporting on standards issues and making suggestions for improvements are described in Engineering Standards Development Manual, CRN GM 002.