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Specification

Inspection and Testing - Roles, Responsibilities and Authorities

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1. General

1.1. Purpose

This Specification sets out the Roles, Responsibilities and Authorities associated with the Inspection and testing for Certifying New and Altered Signalling Works.

1.2. References

This Specification shall be read in conjunction with the CRN System Safety Manual and associated Frameworks, Standards, Specifications and Elements.

This Specification shall be read in conjunction with CRN Infrastructure Engineering Specifications - Signalling:

- CRN SC 006 Signalling Documentation and Drawings
- CRN SC 008 Plans, Programs, Documentation and Packages
- CRN SC 009 Inspection and Testing Principles
- CRN SC 010 Inspection and Testing Procedures
- CRN SC 011 Typical Inspections and Tests for Signalling Apparatus
- CRN SC 013 Interface Requirements and Procedures for Alterations
- CRN SC 012 Standard Forms
- CRN SP 000-CRN SP 052 Signalling Safeworking Procedures Manual
- CRN SD 032 Glossary of Signalling Terms.

This Specification shall be read in conjunction with CRN Infrastructure Engineering Specifications – Signalling for Equipment and Construction:

- As published on the Engineering pages of the CRN Intranet.
- Australian Standards including:
    - AS 4292.1 Railway safety management Part 1: General requirements
    - AS 4292 2 Railway safety management Part 2: Track, civil and electrical infrastructure
    - AS 4292.4 Railway safety management Part 4: Signalling and telecommunications systems and equipment
    - AS/NZS 4360 Risk Management.
- Signal Engineering Instructions and Guidelines As issued from time to time and published on the Engineering pages of the CRN Intranet.

1.3. Definitions, Abbreviations and Acronyms

Signalling definitions are contained in the Signal Engineering Standard CRN SD 032 Glossary of Signalling Terms.

The position names and grades used in this document are current at the time of publishing. Unless otherwise documented, name changed positions shall retain the roles and responsibilities set out herein.

The following definitions are used in this Specification.

Licensed

The term “licensed” shall refer to the competence standards that have been satisfied in the process of the issue of “Statement of Competency” (SoC) in accordance with CRN ST 002 Signalling and Control Systems Personnel - Process for Authorisations and Licensing.

Prior to licensing and renewal, personnel shall have satisfied the relevant board examination, assessment and reassessment requirements as set out in CRN ST 001 Reassessment of Signalling Infrastructure Workers.

Licensed personnel with a current SoC shall be listed in CRN ST 003 Signalling Personnel - Authorisation Status and Licensing Boards, which is updated from time as deemed necessary by the Principal Signal & Communications & Network Control Engineer.

Authorised

The term “authorised” shall refer to the competence standards that have been satisfied in the process of the issue of “Statement of Competency” (SoC) in accordance with CRN ST 002 Signalling and Control Systems Personnel - Process for Authorisations and Licensing.

Authorised personnel hold a partial license and as such may carry out only specific duties as detailed on their SoC.

Authorised personnel with a current SoC shall be listed in CRN ST 003 Signalling Personnel - Authorisation Status and Licensing Boards, which is updated from time as deemed necessary by the Principal Signal & Communications & Network Control Engineer.

Engineering Authority

Overall signalling Engineering Authority for the CRN is delegated to the CRN Principal Signal & Communications & Network Control Engineer by the CRN CEO. This engineering authority is delegated by way of the competency management system which is detailed within CRN ST 002 Signalling and Control Systems Personnel - Process for Authorisations and Licensing.

Variations to standard designs and or equipment or systems shall be only implemented with prior written approval from the Principal Signal & Communications & Network Control Engineer – this may include an ‘in service’ trial as part of a Type Approval.

Engineering Authority for signalling design tasks is delegated by the Principal Signal & Communications & Network Control Engineer to authorised signal designers who hold a signal design SoC that details their particular levels of competency in signal design.

2. Introduction

2.1. General

This Specification applies to the Personnel, Roles, Responsibilities and Authorities associated with the inspection and testing, quality of installation and commissioning work necessary for safety assurance of New and Altered Signalling Works on CRN infrastructure.

Inspection and testing shall be read as including verification and validation tasks.

Notwithstanding the application of the certification inspection and testing of the completed work as set out in the Specifications these will not, in themselves, provide sufficient assurance as much of the installation will be “hidden” from these certification inspections and tests. Therefore, it is imperative that installation work is carried out by suitably licensed and authorised personnel and that the installation practices and workmanship be appropriately supervised, inspected, tested and recorded during the installation. These inspection and tests shall be planned and implemented in an Inspection and Testing Plan and Installation Work Package.

2.2. Interfaces with Network Control and Telecommunications Systems

Signalling Control Systems and telecommunications systems are the responsibility of UGLRL’s telecommunications partner 4Tel, as delegated to them by the Principal Signal & Communications & Network Control Engineer. The signalling Commissioning Engineer shall ensure that prior to commissioning new and altered signalling works that interfaces to a train control or telecommunications system that all functional interfaces are duly certified as inspected, tested, fit for purpose and reliability collaboratively between all groups. Further at commissioning, 4Tel shall provide certification documentation certifying that the system has been inspected, tested, fit for purpose and reliability.

Where the Communications and Control systems are brought into use at a later date using a previously commissioned signalling interface – 4Tel shall be responsible to independently certify and bring the train control or telecommunications system into use. In these instances, 4Tel shall appoint experienced personnel to report to the signalling Commissioning Engineer.

3. Role of Inspection and Testing in the Achievement of System Safety

Signalling inspection and testing, and certification thereof, to current standards by authorised signal designers, licensed and authorised constructors and maintainers is the method of safety assurance of the signalling system.

Signalling inspection and testing is complicated by the spatial spread of signalling interlocking and control functions, the time spread of construction of a signalling project, staging of the works into existing systems and interaction with functional, operational and technical areas of CRN and third parties. It is therefore imperative that all stages of the inspection and testing process are planned and systematically implemented and documented by responsible signalling personnel who place the highest priority on the achievement of system safety.

4. Safeworking, Network Rules and Procedures

It is essential that the Network Rules and Procedures be observed. Testing arrangements must not interfere with or endanger the correct operation of signalling equipment in service.

In particular, testing must not result in false clearance of a signal indication in the face of a train nor allow any set of points to be released after a train has accepted a proceed authority that indicates the points are closed and locked.

Qualified workers shall be provided as protection officers/handsignallers for signals, points and level crossings booked out of use as stipulated in the Network Rules and Procedures.

Network Infrastructure Booking Authority (IBA) form CNRF 003 shall be duly completed for notification of signalling apparatus taken out of use or restored to use and for certification of new or altered works brought into use.

Details of all removals and new and altered works that results in a change to any physical or operational interface with signallers or train drivers shall be published in the Safe Notice with at least one week’s notice prior to the implementation of the changes.

It is desirable that all field activities associated with the de-commissioning, changing-over and testing work and commissioning, be carried out in an environment where rail traffic is excluded. If rail traffic cannot be excluded or will operate in the close proximity, the Signal Project Engineer shall confer with the worksite protection officer to ensure that safety assessments are conducted for the planned work to include any operational risks or hazards associated with the conduct of the signalling work and testing. Planning shall include suitable arrangements for excluding rail traffic when risks cannot be eliminated.

There shall be clear understanding and agreement documented between all involved parties of the safeworking systems to be employed during the period from the shutdown of the old system to the commissioning of the new system.

Signalling equipment installed but not yet commissioned or decommissioned but not yet removed is to be secured against interference.

5. General Responsibilities for Inspection and Testing New and Altered Works

It is the duty of each licensed and/or authorised person performing safety-related work to carry out the work and documentation carefully and competently to the required Standards and in accordance with applicable Specifications and/or approved drawings, and to check their work for completion and quality.

Persons conducting certification inspection and testing are to report each time they detect safety related errors or omissions in the work, equipment or documentation to the Commissioning Engineer.

The Commissioning Engineer is to investigate, advise and appropriately instruct the responsible person / supplier regarding any errors and defects detected and agree on the remedy to be applied. For supplied equipment advice is to be given and remedies agreed with the persons with engineering authority in the matter.

Only type-approved equipment and configurations shall be commissioned.

Basic principles include:

- Each new or altered piece of signalling apparatus shall be inspected, tested and certified
- Appropriately experienced and licensed or authorised personnel shall conduct independent inspection and testing of the work
- Construction of new and altered signalling shall be conducted in accordance with the relevant Standards, Procedures and Instructions by suitably experienced licensed or authorised Signal engineers, Site managers, Team leaders, Work group leaders, Signal electrical / mechanical personnel.

5.1. Interface Planning

The Commissioning Engineer and the Signalling Maintenance Engineer are responsible to ensure that all authorised new and altered signalling works proceed pursuant to a Project Work Interface Agreement and Interface Coordination Plan.

Specification CRN SC 013 Interface Requirements and Procedures for Alterations sets out the required procedures for:

- Alterations and new interfaces
- Authority for alterations to existing installation
- Approval to commence alterations

- Interface Coordination Plan
- Detailed Site Assessment (Site Integrity Agreement)
- Precautions to be agreed.

5.2. Independence of Certification Inspection and Testing

The principle of independent inspection and testing of new and altered work is that no safety critical outcome should rely solely on one person doing and also certifying their own work. The independent person conducting the inspection and testing and certification work is doing and is responsible for the safety critical work.

In essence, any person who has installed vital equipment or circuits for new and altered work shall not carry out the certification inspection and tests of the particular items or circuit elements that they have installed.

At a project engineering level there are integrity advantages in having more rather than less familiarity with the physical and functional characteristics of the project. For example, the Project Engineer in the role of Commissioning Engineer has the direct knowledge of the project, its interfaces and history necessary to ensure comprehensive inspection and testing planning, coordination and implementation.

In deciding the appropriate degree of independence, a balanced judgement by experienced signal engineers is necessary depending on the nature and complexity of the project however the major determinant would be the licensing to the required level, competence and experience of the person performing the certification inspection and testing. The lack of availability of suitable personnel shall not justify any lowering or absence of the required independence.

6. Personnel Responsibilities and Authorities

6.1. Principal Signal & Communications & Network Control Engineer

The Principal Signal & Communications & Network Control Engineer is the person who holds engineering signalling design authority for authorising and approving configuration and design changes to the existing or new signalling system in accordance with the CRN Engineering Principles, Standards, Specifications, Manuals, Instructions and Guidelines. The Principal Signal & Communications & Network Control Engineer may delegate various engineering design authorities and responsibilities in accordance with CRN ST 002 Signalling and Control Systems Personnel - Process for Authorisations and Licensing.

The Principal Signal & Communications & Network Control Engineer shall nominate for new equipment and systems:

- The Type Approval and Design,

- The principals for integration, interfaces and standards,
- The inspection and testing tasks and/or pass/fail criteria required,
- The maintenance requirements, plans and manuals,
- The training criteria.

The Principal Signal & Communications & Network Control Engineer is also responsible for ensuring signalling design drawings are maintained updated and that updated copies are issued promptly to relevant maintenance personnel.

The Principal Signal & Communications & Network Control Engineer shall provide safety assurance through the following activities to ensure the timely issue of checked and approved designs with no significant errors or omissions and also to validate the installed design:

- System design to functional requirements and to signalling design standards by appropriately qualified and experienced signal design engineers.
- Verification of design by independent appropriately qualified and experienced signal design engineers.
- Design integrity tests of installed systems to standard interlocking and control principles by appropriately qualified and experienced signal design engineers.

Where new or altered works are to interface with existing signalling the Principal Signal & Communications & Network Control Engineer (or their delegate) and the Commissioning Engineer shall together satisfy themselves of the accuracy of the existing design drawings, in consultation with the Signalling Maintenance Engineer.

6.2. Design Authority

The Principal Signal & Communications & Network Control Engineer shall exercise the delegated responsibilities and engineering signalling design authority for authorising and approving configuration and design changes to the existing or new signalling system in accordance with the CRN Engineering Principles, Standards, Specifications, Manuals, Instructions and Guidelines.

6.3. Project Engineer

The Project Engineer has the responsibility to ensure that the new and altered works are planned, installed, inspected and tested to Design, Specification and Schedule. The responsibilities nominated for the Commissioning Engineer shall be read as those for the Project Engineer when the Project Engineer is also the Commissioning Engineer.

The Project Engineer is responsible for:

- For the installation compliance with Equipment and Infrastructure Engineering Specifications
- Directing controlling and ensuring that all the installation inspection and testing plans, procedures, activities and tasks are competently and correctly completed and recorded
- Liaising with the Signalling Maintenance Engineer or their nominated representative with regard to Interfaces
- For signing off some elements of the safety assurance of completed works, and for certifying that the systems and equipment have been properly installed using an Inspection and Testing Plan and Installation Work Package, have undergone and passed the specified pre-commissioning tests and inspections necessary to ensure safe and reliable operation. Further, the Project Engineer is responsible to ensure that all outstanding inspections and tests are carried over (transferred) to the Commissioning Work Package for completion during the Commissioning phase
- For ensuring that the materials and equipment provided meet the Specification requirements, are Type approved where required, and have been through the normal (or any special) acceptance inspection and testing procedures. The Project Engineer shall advise the Commissioning Engineer (where applicable) accordingly and provide the specified documentation appropriately completed and signed
- Planning and supervision of the installation and carrying out quality control inspection and tests from the initial stages of the works to ensure that the signalling will operate reliably and be ready for certification testing as planned without any necessity for rework or modification at a stage where critical path, critical resource or critical costs could jeopardise the orderly conduct of certification testing
- For ensuring that the installation work does not interfere with the normal operation and integrity of the railway. All work shall be planned and implemented as agreed in consultation with the various relevant asset owner/s and documented in the Project Work Interface Agreement and Interface Coordination Plan for the works
- For ensuring that safe access is provided to signalling apparatus in consultation with the Signal Maintenance engineer or their nominated representative. The Project Engineer is responsible for ensuring that the signalling equipment is set out and located in accordance with the signalling design principles
- Prevent any further interference with the signalling following and during certification testing except under the direction of the Commissioning Engineer
- The Project Engineer shall ensure that the existing signalling is secure against accidental or inadvertent interference; otherwise, the existing signalling shall be disconnected and included in the certification inspections and tests prior to restoration into use.

Signalling Works - Installation Phase

- Collaborate with the Signalling Maintenance Engineer or their nominated representative to develop and obtain authorisation of the Project Work Interface Agreement and Interface Coordination Plan for the new and altered works then keep them updated (CRN SC 013)
- Collaborate with the Signalling Maintenance Engineer or their nominated representative for the provision of access and possessions in accordance with the Works program
- Advise the Signalling Maintenance Engineer or their nominated representative of the limits, timing, exclusions of other work groups/work trains and contingency planning requirements for possessions required to construct the works
- Preparation of the Installation Work Package
- Gain “Approval in Principle” from the Signalling Maintenance Engineer or their nominated representative for the Installation Work Package
- Implement the Installation Work Package
- Authorising and registering Installation work instructions
- Issue, use and completion of Installation work instructions
- Receiving, checking and actioning Installation work instructions
- Completion of the Register of Work Instructions.

Minor Signalling Works, Preparation - Installation and Commissioning Phases.

The Project Engineer shall also be the Commissioning Engineer for all works utilising a Minor works package. Roles and responsibilities shall generally be as for major signalling works, and:

- Preparation of the Works program, Minor works package
- Documenting the scope of works to be covered by the implementation and commissioning including:
    - Inspection, testing and certification work package documentation requirements for the installation and commissioning work
    - Integrity and/or system function testing requirements to be conducted by the Commissioning Engineer
- Review and authorise the Minor works package
- Obtain approval in principle to use the Minor works package
- Implement the Minor works package:
    - Receiving, checking and actioning the work instructions
    - Issue to the team leaders - copies of the “Minor Signalling Works - Installation, Inspection, Testing and Commissioning Log” (Minor Works Log) to be maintained

throughout the works. Regularly collect and review the Log sheets to oversee the resolution of the reports

- Document and report in the “Minor Works - Log” all defects, defective material, incidents and items requiring further action related to the performance of the installation, inspection, testing and commissioning of the works
- Attend to post commissioning defect rectification and arrange project closeout / Practical and Final Certificates.

6.4. Commissioning Engineer

The Commissioning Engineer is responsible for the inspection testing and certification of the project from concept till completion.

If appointment to the project occurs after partial completion of the project then the Commissioning Engineer shall have the authority to order retesting, examination or uncovering of any portions of the installation where there is any doubt, insufficient documentation or lack of evidence of independent verification. All preceding installation inspection and testing records shall also be endorsed by the Signal Engineer to whom the certification personnel reported, and that person shall be considered as having the same responsibility as the Commissioning Engineer up to that point in time.

The Commissioning Engineer is responsible for determining that the commissioning can proceed. If errors are discovered in certification testing that cast significant doubt on the overall effectiveness of the design checking or installation supervision, the Commissioning Engineer shall confer with the Principal Signal & Communications & Network Control Engineer, Signal Maintenance Manager and the Signalling Maintenance Engineer or their nominated representative to agree on appropriate risk mitigation strategies to be implemented

The responsibility for the certification of the safety of signalling works to be commissioned ultimately lies with the Signal Engineer who signs the works as “brought into use”.

- Regardless of the nature of the signalling works the Signal Engineer responsible for safety certification and bringing the works into use is to be designated as “Commissioning Engineer”,
- By signing signalling works into use the Commissioning Engineer is attesting to the infrastructure integrity and reliability of the new or altered signalling in accordance with CRN Standards, Specifications, Manuals, Procedures, Guidelines and Signal Engineering Instructions.

The Commissioning Engineer is accountable for the certification inspection and testing of the signalling works, prior to commissioning, to verify that it is:

- In conformance strictly with issued designs duly certified as checked and approved by authorised signal design engineers (including amendments and modifications),

- In compliance principally with the applicable standard specifications for signalling safety and reliability,
- And consistent with basic signalling principles and practices.

The Commissioning Engineer is not responsible for the signalling design that is the responsibility of the Principal Signal & Communications & Network Control Engineer or delegated representative.

The Commissioning Engineer shall be responsible for:

- Ensuring that commissioning Inspection, Testing and Certification activities are performed by experienced, independent, licensed personnel,
- Ensuring that commissioning inspection, testing and certification activities reveal not only discrepancies between the installation and the signalling designs, but also will bring to attention basic flaws in the integrity of the signalling design and substandard workmanship and/or equipment,
- Closely liaising with the Principal Signal & Communications & Network Control Engineer or delegated representative in relation to the planning and implementation of design integrity testing and all matters of design.
- Closely liaising with the authorised 4Tel delegate in relation to the co-ordination, planning and implementation of Control Systems testing and test plans.

Where new or altered works are to interface with existing signalling the status of implementation of any previously issued design and jobs shall be established in accordance with the provisions set out in Specification CRN SC 013 Interface Requirements and Procedures for Alterations.

The Commissioning Engineer and the Principal Signal & Communications & Network Control Engineer or delegated representative shall ensure that signalling design drawings used for certification inspection and testing are the final approved designs inclusive of all modifications. The Commissioning Engineer shall obtain details of and ensure the registration and testing of any modifications issued from the Principal Signal & Communications & Network Control Engineer or delegated representative.

- Referring any unusual or special arrangements or proposals not in accordance with documented standards to the Principal Signal & Communications & Network Control Engineer for determination. Any approved variations shall be implemented in accordance with the provisions stipulated within a Waiver or an approved design modification,
- Ensuring observance of the Network Rules and Regulations for bringing new and altered works into use,
- Ensuring that updated Interim Maintenance Copy drawings are available for maintenance personnel prior to booking into service

- Promptly certifying and returning the “Certified Office Copy” design drawings following completion of the works to the Principal Signal & Communications & Network Control Engineer or delegated representative via the Signalling Maintenance Engineer or their nominated representative without delay and within 28 days,
- Ensure the use of the specified control documentation to ensure that all safety-related inspections and tests performed are integrated, that no safety-related test is missed, and all certifications are obtained prior to commissioning.

The Commissioning Engineer shall not allow the certification testing to be jeopardised by compression into too small a time-scale that over-extends testing personnel.

The Commissioning Engineer may conduct Design Integrity testing for *Minor signalling works* to a design integrity test plan provided and approved by signal design.

Commissioning – Preparation Phase

- Advise the Signalling Maintenance Engineer or their nominated representative of the limits, timing, exclusions of other work groups/work trains and contingency planning requirements for possessions required to commission the works or stage works,
- Ensure the transfer of all outstanding activities from the Installation Work Package,
- Preparation of the Commissioning Work Package,
- Arranging pre-commissioning conferences and briefings,
- Documenting the scope of works to be covered by the commissioning,
- Coordinating with the design Team leader for the Design integrity testing requirements,
- Identifying teams required,
- Preparing the program,
- Preparing the Commissioning Notice,
- Preparing the Work instructions,
- Review and authorise the Commissioning work package,
- Obtaining approval in principle to use the Commissioning work package,
- Authorising and registering Pre-Commissioning work instructions,
- Issue, use and completion of Pre-Commissioning work instructions,
- Receiving, checking and actioning Pre-Commissioning work instructions,
- Completion of the Register of Work Instructions.

Commissioning – Implementation Phase

- Implementation of the Commissioning Work Package,

- Control of the Register of Work Instructions,
- Control of the Commissioning Log,
- Registering all Work Instructions,
- Preparing, authorising and registering new Commissioning work instructions,
- Issue Commissioning work instructions,
- Receiving, checking and actioning Commissioning work instructions,
- Completion of the Register of Work Instructions,
- Updating the register and filing completed Work Instructions,
- Monitoring the Program,
- Complete the Commissioning Status Certificate and sign off,
- Commission the new and altered works in accordance with the Network Rules and Procedures,
- Updating throughout the commissioning period the Interim circuit books, Drawings and preparation of any Track History Cards for issue at completion.

Commissioning – Evaluation Phase

- Check that copies of all Safeworking Forms and Permits are in the Package,
- Check that copies of all Signalling Safeworking records are in the Package,
- Insert a copy of the Attendance Book in the Package,
- Control the Register of Post Commissioning Work Instructions,
- Issue Post Commissioning Work Instructions,
- Prepare, authorise and register new Post Commissioning work instructions,
- Receiving, checking and actioning Post Commissioning work instructions,
- Completion of the Register of Post Commissioning Work Instructions
- Updating the register and filing completed Work Instructions,
- Monitoring the Program,
- Conduct the Post-Commissioning Meeting,

6.5. Division of Roles and Responsibilities for Project and Commissioning Engineers

Where a project is planned to have both Project and Commissioning Engineers the typical arrangements required shall be in accordance with the following sections or otherwise as varied by a documented agreement between the parties.

For the pre-commissioning, commissioning and post-commissioning phases the Project Engineer shall continue to complete the construction work, testing, defect rectification and handover under the control of the Commissioning Engineer.

6.5.1. Project Engineer

6.5.1.1 General

Manage or effectively delegate all aspects of the construction engineering and commissioning (with the exception of activities nominated for the Commissioning Engineer) of signalling system to final certificate including:

6.5.1.2 Design and Document Control

- Procedures to ensure use of approved and current versions of Plans.
- Collaborate with the Regional representative and Signal design for all matters associated with the Signal Design. Responsible for the site management of Signal Design up to the Commissioning Period. Certify as updated and handover “Commissioning copies” of the Signal design to the Commissioning Engineer at the start of the Commissioning period.
- Registration of Working drawings and documents.
- Implements the site aspects of the signalling document control.

6.5.1.3 Site Engineering Design

(Engineering Design Authority)

- Type Approvals,
- Detailed Site Survey Plans,
- Signal Sighting Agreements,
- Services Searches.
- Construction / Installation Drawings and documents.

6.5.1.4 Interface Plan

(All Functional Areas & Regional signal representative).

- Project Work Interface Agreement with the Regional signal representative.
- Interface Coordination Plan with the Regional signal representative and 3rd Parties.
- Site access and Possession requirements with the Regional representative.
- Statutory Approvals.
- Special Requirements.
- Operational requirements including:
    - Safe Notices
    - Special Train Notices.
- Electrical – power and lighting
    - New supply points
    - Upgrading of new supply points
- Electrical – traction supply
    - Air gap locations
    - Overhead wiring clearances
    - Arrangements at substations and section huts
- Safe access arrangements to signals and trackside equipment
- Telecommunications systems including signalling safeworking telephones
- Train control systems
- Stageworks
- Configuration management (information to client)
- Conducts and minutes regular Project and Commissioning Planning Meetings with Regional, Commissioning, Testing and site personnel
- Prepares Commissioning Notice
- Arrange pre-commissioning conference with the Regional representative and the Team leaders of the commissioning work teams.

6.5.1.5 Detailed Implementation of Requirements

- Scope, equipment, materials, plant, construction resources and cost control,
- Preparation and updating the Summary and Detailed Works, Installation, Inspection & Testing and Commissioning programs,
- Ensure effective Process control

- Ensure the clear identification of all “Out of use” Signalling equipment
- Preparation and implementation of the Inspection and Testing Plan (Strategy, Outline and Detailed Plans)
- Preparation and Implementation of the Installation Work Package
- Conduct (or delegate) the inspection of all site installation and apparatus e.g., cable route inspection, foundations and equipment set out
- Conduct (or delegate) the testing e.g., documentation checks, wiring Pre-tests and checks, earthing and cable insulation testing.
- Manages the resources, equipment and process of the formal inspection and testing
- Preparation of the Commissioning Work Package:
- Project schedule and plant-materials and personnel resources for construction, Pre-testing, Inspection and commissioning
- Collaborates with the Project manager, Team manager/s and Commissioning Engineer for the provision of construction and testing resources.
- Collaborates with the Regional representative for the provision of the necessary track Possessions, rail traffic management coordination including provision of test locomotives.
- Access control and protection.
- Defects rectification.
- Provision to maintenance of timely “Interim Maintenance Copies” of circuit books, plans and drawings. Track history cards, updated asset change data and any other required documentation.
- (Where applicable) Preparation, Implementation, Commissioning and Handover of Signalling Works utilising a Minor Works Package
- Provision of Handover Documentation Package, Practical and Final completion.

6.5.1.6 Quality Assurance

- Quality Management System
- Procurement and Contract management
- Equipment/material test certificates complete and retained
- Maintains records of the calibration of test equipment used for certification inspection and testing of infrastructure.
- Archive of project files and testing documentation.

6.5.1.7 Environmental Management System

- Develop, implement and manage the required system and processes

6.5.2. Commissioning Engineer

6.5.2.1 General

Involved with the project from and including the Concept development stage until post commissioning. Monitors and audits the implementation of the Inspection and Testing Plan and Installation Work Package. Responsible for the formal inspection, testing and certification on site and at supplier's premises.

Monitor installation, inspection, testing and commissioning processes including:

- Review and Authorise the Inspection & Testing Plans.
- Review and Authorise the Installation Work Package.
- Review and Authorise the Testing and Commissioning Program.
- Nominates any areas of the Inspection and Testing Plan to be undertaken by the Project Engineer.
- Reviews and audits Pre-test certificates and equipment test certificates.
- Implements the inspection, testing and commissioning portion of the Commissioning Work Package procedure/s.
- Ensures experience and licensing of personnel proposed for testing / commissioning activities.
- Review & Authorise the Commissioning Work Package/s.
- Issue "Statements of Competency" to all licensed personnel.

6.5.2.2 Certification Inspection and Testing

Responsible for the effective implementation of the formal inspection, testing and certification of the Works,

- Controls and directs the Test Engineers and teams,
- Audits the inspection and testing process and records,
- Manages the use and control of certification documentation.

6.5.2.3 Design and Document Control

- Responsible for the management of Working drawings and Modifications during the Commissioning Period.

- Responsible to ensure certification of Working drawings during the commissioning period e.g., Signalling Plans and Track Insulation Plans.

6.5.2.4 Site Engineering Design

- Responsible to ensure completion of certification of Site drawings and Signal design during the commissioning period e.g., Signal sighting Forms, Signalling and Track insulation Plans.

6.5.2.5 Pre-Commissioning

- Controls and coordinates planning of any permitted “Other Party” works during the Commissioning period.
- Pre-arranges for the coordination, content and delivery of infrastructure certification by “others” that directly interface with the Signalling system e.g., Train Control & Telecommunication systems, Electrical power or traction, Trackworks, Civil or others.
- Conducts the Pre-commissioning meeting with the Team leaders of the commissioning work teams.

6.5.2.6 Commissioning

- Responsible for the overall control and implementation of the Commissioning Work Package.
- Responsible for the registration and process of application and removal of temporary circuit bridging applied for commissioning purposes.
- Responsible for the registration and implementation of all approved design modifications issued during the commissioning period.
- Responsible to ensure provision of infrastructure Certification by integrated works by “others” prior to booking the signalling infrastructure into use.
- Responsible for the completion of the Commissioning Certificate authorising to proceed to “Bring-into-use”.
- Commission the new and altered works into use in accordance with the Network Rules and Procedures.

6.5.2.7 Post Commissioning

Responsible for the evaluation of the Commissioning Work Package and development and implementation of new Post Commissioning Work instructions including:

- Transfer from the Commissioning work package new or outstanding commissioning activities to Post commissioning Work instructions.

- Transfer to the Project Engineer the Post commissioning activities and work.
- Completes the Infrastructure integrity Certification in accordance with Infrastructure Division requirements
- Conducts a post-commissioning inspection of the working newly commissioned installation and train inspection of the signal sighting.
- Mark up, sign-off and return of the Certified Office Copies (COC's) of design issued drawings and documents.
- Conducts Post commissioning reviews of the Project completion lessons learnt and process improvement and feed back to the Project manager.

6.6. Test Engineer

On larger projects a dedicated Test Engineer may be designated to undertake the following tasks. They are responsible for who carries out independent inspection, testing and certification as required by the CRN Infrastructure Engineering Specifications and Signalling Safeworking Procedures under the control and direction of the Commissioning Engineer. On smaller projects the Commissioning Engineer shall ensure that these actions are completed.

Test Engineers shall:

- Verify that the installation and equipment conform to the approved Design and Site drawings.
- Comply with the procedures and practices particularly nominated in the Specifications for the Inspection, Testing and Certification of New and altered works.
- Exercise the authority to require re-testing of portions of the work where doubt arises as to the performance of testing assistants, integrity / security / interference or issues. The scope and overall management of the situation is to be agreed with the Commissioning Engineer.
- Verify that the installation complies with the applicable Equipment and Construction specifications regarding the installation quality, personnel access, safety and reliability.
- Challenge and bring to the attention of the Commissioning Engineer any unclear, unusual or unsatisfactory feature of the vital design or installation and any potential risk to the reliability and integrity of the signalling.
- Form independent test team/s consisting of suitably competent and experienced personnel,
- Assess Test assistant's knowledge of the communication protocols to be used and ensure the appropriate familiarity with the particular apparatus and testing procedures.

Use of Testing Assistants

Test assistants shall carry out independent inspection, testing and certification plus documentation as directed by the Test Engineer.

Persons assisting in certification testing shall diligently carry out the instructions of the Test Engineer and assist in ensuring the tests are correct and comprehensive.

6.7. Interface with the Signalling Maintenance Engineer or their nominated Representative

The Infrastructure group is primarily responsible for infrastructure integrity; this includes permission for access and provision of track possessions, Project Work Interface Agreements, Interface Coordination Plans and review or overview of the delivery of new and altered works delivered by other divisions and 3rd parties.

For each project / job a signal representative shall be nominated to be responsible for the following:

- Approval, development process and maintenance of interface coordination planning throughout the project lifecycle,
- Collaborate for the provision of the necessary track possessions and access in accordance with the, Project Work Interface Agreement, Interface Coordination Plan and the Works Program,
- Arrange for the provision and issue of the approved design and manage the control of documentation throughout the project life cycle,
- Manage configuration control process to provide and maintain accurate status of the approved configuration of equipment on the region,
- Manage configuration management (update documentation and databases) to ensure records accurately reflect existing assets,

In order to authorise commissioning of the works, the Signalling Maintenance Engineer or their nominated representative shall remain satisfied that the works are principally to the agreed requirements, by regular liaison with the Project Manager throughout the project and by approval-in-principle of the installation and commissioning work packages.

Signalling Works - Installation Phase

- Collaborate with the Commissioning Engineer to develop and authorise the Project Work Interface Agreement for the new and altered work. Maintain the Interface Coordination Plan for the duration of the works (CRN SC 013 Clause 1.6)
- Collaborate with the Project team to provide possession access in accordance with the Works Program. Manage detail possession planning to ensure that optimal use by the project
- Change manage (when required) the possession arrangements in consultation with the Project team to take advantage of new opportunities or mitigate negative effects

- Approve in principle the Installation (or Minor) Work Package
- Collaborate the implementation of the work with the Signalling Maintenance Engineer or their nominated personnel for the provision of the new or altered Signalling works. This is achieved by:
- Holding regular meetings with the signalling maintenance personnel to inform, advise progress and resolve issues,
- Initiating and managing the configuration management process for the works including Technical Maintenance Plans,
- Arrange appropriate maintenance personnel involvement in the new and altered works to provide adequate familiarity with the scope of works, equipment / systems being constructed, the location/s affected by the work and any identification / marking in use to distinguish them,
- Manage the Asset and Configuration control processes.

Commissioning – Preparation Phase

- Coordinate possession detail planning to ensure that other works are excluded when not compatible with the commissioning process
- Arrange for the publishing of SAFE Notices and Circulars
- Arrange for test locomotives as required by the Commissioning Engineer
- Approve in principle the Commissioning Work Package/s.

Commissioning – Implementation Phase

- Change manage (when required) the possession management in consultation with the Commissioning Engineer to mitigate risks to the commissioning process
- Arrange appropriate maintenance personnel involvement in the new and altered works to provide adequate familiarity with the equipment/systems being “brought into use”, the location/s for storage of Interim design and spare equipment
- Arrange attendance for follow up activities e.g., points adjustments due to track settlement, track circuit adjustments and stand-by.

Commissioning – Evaluation Phase

- Manage the distribution of Interim design prior to the first peak,
- Attend the Post Commissioning Meeting,
- Close out any applicable Configuration Control processes.

6.8. Construction Personnel

6.8.1. Work Group Leader (WGL)

WGL's are responsible to implement CRN Policies, Standards, Specifications, Instructions, Practices, and Procedures including Installation and Commissioning Inspection and Testing Plan/s, Work packages and Work instructions for the preparation, implementation and evaluation of the works as directed by the Commissioning Engineer and/or the Site manager. WGL's shall construct the works to Specification and lead work team/s and/or Contractors, supervise and conduct installation inspection and testing activities within the limitations of their licence as stipulated in CRN ST 002.

The WGL is responsible to implement the Installation and Commissioning Inspection and Testing Plan/s, Work instructions for the preparation, implementation and evaluation of the works as directed by the Project/Commissioning Engineer.

Where a project structure does not include a site manager, the WGL shall nominate an appropriately competent and experienced person whose responsibilities shall include those nominated herein for a site manager.

The WGL is responsible to ensure the implementation of the following activities or delegate and effectively communicate to the various team leaders and work groups:

- Review, agree and assign delegated responsibilities in line with the responsibility assignment matrix (R.A.M.),
- Apply policies and procedures to ensure the highest standards of OH&S, Safeworking, Environmental and Quality principles are practiced and maintained in the workplace,
- Implement the construction of the works to specification by leading multi-discipline work team/s or contractors, supervise, and conduct installation inspection and testing activities within the limitations of their licence,
- Organise and direct personnel and materials in the construction of the works,
- Organise and direct plant for the construction of the works,
- Supervise quality and specification compliance during the construction of the works,
- Perform, sign and return work instruction/s,

The WGL shall be responsible for the management of personnel and equipment including: Resource planning, depots, vehicles, WHS, briefing, rostering, training, PPE, briefing fellow workers and provision of access to and/or copies of CRN Infrastructure Engineering Standards, Specifications, Procedures, Instructions and Divisional Instructions.

The WGL shall oversee the personnel "Experience and Assessment Log Books" to verify the correct use and identify experience requirements.

The WGL shall allocate personnel resources primarily to fulfil the job requirement for licensing and/or authorisation, experience and knowledge of the equipment and systems involved. Further, shall allocate personnel to facilitate the maintenance of experience on all types of equipment and systems. Where a “Statement of Competency” nominates that “work under supervision” is required, in collaboration with site management arrange to allocate to the areas where the required experience may be gained.

The WGL is responsible to ensure the provision of adequate personnel requirements, whilst ensuring independence of verification personnel.

The WGL may carry out Signalling duties in accordance with their CRN licence and/or authorisation.

6.8.2. Site Manager

Appointed on specific projects, is responsible to safely resource, procure and implement the construction of the new and altered project infrastructure whilst ensuring the integrity of the existing infrastructure to design and specification. The Site Manager shall be responsible to manage the completion of the installation and commissioning inspection and testing plan/s and work instructions for the preparation, implementation and evaluation of the works as directed by the Project/Commissioning Engineer.

Where a project is not allocated a Site Manager, the responsibilities shall be managed by the Project Engineer in consultation with the Commissioning Engineer.

- The Site Manager shall direct and manage a multi-disciplinary work team (or teams/contractors) engaged in the construction of the project to ensure safety, time, resource and budgetary constraints under the direction of the Commissioning Engineer including: Develop in consultation with the Commissioning Engineer, review, agree and assign and monitor delegated responsibilities in line with the responsibility assignment matrix (R.A.M.),
- Supervise, direct and conduct installation inspection and testing activities within the limitations of their licence,
- Ensuring the works are constructed in accordance with the relevant CRN practices and procedures, Signal Construction Standards, Instructions and Guidelines,
- Ensuring the works are constructed in accordance with the approved design,
- Ensuring the works are implemented in accordance with the requirements of the Signalling Safeworking Procedures Manual (TMG J),
- Ensuring the works are implemented in accordance with the Network Rules and Procedures,

- Ensuring that the works are implemented in accordance with the Project Work Interface Agreement and Interface Coordination Plan,
- Ensuring the works are constructed, documented and inspected and tested in accordance with the approved Installation Work Package,
- Ensuring the construction work is conducted by personnel who have the relevant experience and licensing whilst ensuring independence of verification personnel,
- Ensuring the construction work is conducted and documented to comply with approved quality processes including rectification work, timely procurement, storage and preservation of materials, works program and costs,
- Arranging for sufficient personnel, whilst ensuring independence of verification personnel,
- Responsible for the performance, signing and returning of work instruction/s.

Signalling Works - Installation Phase

Responsible to support the Commissioning Engineer and perform the delegated tasks as directed:

- Safely manage the construction of the works to CRN Standards, Manuals, Instructions, cost and time, including plant, personnel, equipment and material resources,
- Team leader as nominated on Installation Work Instructions,
- Arrange for, set up and test construction site communications systems, prepare registers for recording details of issue.

Commissioning – Preparation Implementation and Evaluation Phases

Responsible to support the Commissioning Engineer and perform the delegated tasks as directed:

- Safely manage the implementation, commissioning and evaluation of the works to CRN Standards, Manuals, Instructions, cost and time, including plant, personnel, equipment and material resources
- Manage the construction activities, plant, personnel and material resources
- Implement and or conduct as Team leader - Work instructions as nominated by the Commissioning Engineer
- Arrange for, set up, pre-test and manage commissioning communications systems, prepare registers for recording details of issue
- Manage the provision and suitable registration of commissioning spares, and equipment e.g., Spare signalling apparatus, torches and batteries, emergency wet weather gear and tarpaulins
- Manage the completion of site clean up

- Removal of any equipment housings, redundant wiring, cable routes and air lines
- Removal and disposal of remaining redundant equipment / foundations, stockpiles.

Minor Signalling Works

Roles and responsibilities shall generally be as for major signalling works, and:

- Document and report in the “Minor Signalling Works - Installation, Inspection, Testing and Commissioning Log” (Minor Works Log) all defects, defective materials, incidents and items requiring further action related to the performance of the installation, inspection, testing and commissioning of the works. Regularly (weekly) present the log to the Commissioning Engineer for review and sign off.

6.9. Typical Project Responsibility Assignment Matrix (R.A.M.)

The following R.A.M.s are typical for a project. Each project shall review and assign responsibilities in line with the particular project scope, organisational structure, skills and licensing of the allocated project personnel. The project matrix shall be updated to reflect any changes occurring within the project lifecycle. All permanent or temporary stakeholders shall be notified of their responsibilities and updated to any changes. Roles and responsibilities associated with construction site safety shall be detailed in a “Site Safety Management Plan” for the works.

Responsibility Assignment Matrix: CRN Infrastructure Division

Renewals / Major Projects	File No:	Document No:
Description: *Construction of New & Altered Signalling*	Date:	Revision No:
Project:	Project phase: *Preparation*	

WBS	Activity -Task	Project Management/Construction Group										Infrastructure Division			Regulatory Authorities			Community			CRN Other		
	Key position:	PM	TTM	CE	TE	SM	SMS	SDM	WGL	CS	TM	AE	ME	RR	W Cov	EPA					Track	Elec	Civil
1	Scope Documentation & Budget	A	C	R	C	S	C	C	C		C	I	I	SO							C	C	C
2	Signalling Works Program	A	I	R	C	S	C	C	S	S	C	I	I	C	I	I		C			C	C	C
3	Configuration Change Request	S		S		S		S	S			R	I	A							C	C	C
4	Site Safety Management Plan	SO		A	I	R	I	I	S	S	C	I	I	C							I	I	I
5	Project Works Authority	A	I	S	I	S		S	I	I	C	SO	SO	R							C	C	C
6	Interface Plan	A	I	C	C	C		C	C	I	C	C	C	R							C	C	C
7	Design Coordination	I		C	C	C		S	C			R		A							C	C	C
8	Signal Sighting / D.S.S's	A	I	R	S	S		S	S	S		I	C	SO							C	C	C
9	Possession Utilisation	C	I	A	C	R	S	C	S	S	C	C	C	C							C	C	C
10	Inspection & Testing Plan	A	I	R	C	S		C	S	S	C	C	C	SO									
11	Installation Work Package	A	I	R	C	S		C	S	S	C	C	C	SO									
12	Construction Program	C		A	C	R	S	C	S	S	C	I	I	SO							C	C	C
13	Scope - Variation Mgmt	R		C	C	C	I	C	I	I		C	C	A									
14	Communications Planning	A	I	R	I	I	I	I	I	I	I	I	I	I	I	I		I			I	I	I
15	Procurement	I		A	C	R		C	C	I	S												
16	Compliance & Audit	R	C	S	S	S		S	S	S	S	I	I	A									

	Personnel legend	**PM** - Program/Project Manager	**TTM** - Snr Tech Team Mgr	**CE** - Commissioning Engineer	**TE** - Testing Engineer
		SM - Site Manager / Team Leader	**SMS** - Service Manager Signals	**SDM** -Signal Design Mgr	**WGL** - Work Group Leader/s
		CS - Construction Staff	**AE** - Asset Engineer	**ME** - Maintenance Engineer	**RR** - Regional Representative
		W Cov- Work Cover	**EPA**- Enviro Proction Auth	**TM** - Team Manager	
	Responsibilities Legend	**R** -Responsible	**A** - Accountabl	**C** - Consult	**S** - Support	**I** - Inform	**SO** -Sign off

NOTE: Team Leaders responsibilities shall be those of the Site Manager where no Site Manager is attached to the project

Responsibility Assignment Matrix: CRN Infrastructure Division

Renewals / Major Projects	File No:	Document No:
Description: *Construction of New & Altered Signalling*	Date:	Revision No:
Project:	Project phase: *Implementation*	

WBS	Activity -Task	Project Management/Construction Group										Infrastructure Division			Regulatory Authorities			Community			TfNSW Other		
	Key position:	PM	TTM	PE	TE	SM	SMS	SD	WGL	CS	TM	AE	ME	RR	W Cov	EPA					Track	Elec	Civil
1	Communications Plan	A	I	R	I	I	I	I	I	I	I	I	I	I	I	I					I	I	I
2	Services Locations / Protection			R		I			I	I				A									
3	Design Document Control	I		R	I	I		C	I	I		A	I	I									
4	Site Document Control	I		A	I	R		C	I	I		I	I	SO									
5	Construction	I		A	S	R	S	S	S	S	S			I									
6	Staff Allocation-Construct	I		C	I	A	R		I		S												
7	Cost & Schedule Management	I		A	C	R	I	C	S	I				I									
8	Scope - Variation Mgmt	I		A	I	R		C	I	I		I	I	SO									
9	Installation Work Package	I	I	A	S	R			S	S	C	I	I	SO									
10	Develop Commissioning W.P.	I	I	A	R	S		C	S	S	C	I	I	SO									
11	Compliance & Audit	I	C	A	S	R		S	S	S	S	I	I	I									
12																							
13																							
14																							
15																							
16																							

	Personnel legend	**PM** - Program/Project Manager	**TTM** - Snr Tech Team Mgr	**PE** - Project / Commissioning Engineer	**TE** - Testing Engineer
		SM - Site Manager/Team Leader	**SMS** - Service Manager Signals	**SDM** -Signal Design Mgr	**WGL** - Work Group Leader/s
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	Responsibilities legend	**R** -Responsible	**A** - Accountable	**C** - Consult	**S** - Support	**I** - Inform	**SO** -Sign off
		NOTE: Team Leaders responsibilities shall be those for the Site Manager where no Site Manager is attached to the Project			

Responsibility Assignment Matrix: CRN Infrastructure Division

Renewals / Major Projects	File No:
Description: *Construction of New & Altered Signalling*	Date:
Project:	Project phase: *Evaluation*

Document No:	
Revision No:	

WBS	Activity -Task	Project Management/Construction Group										Infrastructure Division			Regulatory Authorities			Community			TfNSW Other		
	Key position:	PM	TTM	PE	TE	SM	SMS	SDM	WGL	CS	TM	AE	ME	RR	W Cov	EPA					Track	Elec	Civil
1	Scope - Variation Mgmt	I		A	C	R		C	I	I	I	I	I	SO									
2	MIMS Asset Update Information	I		C	S	S		C				A	R	C									
3	Teams II,MIMS Service Schedule	I		C	S	S		C				A	R	C									
4	Delivery of C.O.C's	I	I	R	S	C		C				I	I	A									
5	Delivery of As-Built D.S.S's	I	I	R	S	S			S	C		I	I	A									
6	Handover Package	I	I	R	S	S			S			I	I	A									
7	Practical Completion Certificate	I	I	R	S	S			C			I	I	A									
8	Final Certificate	I	I	R	S	S			C			I	I	A									
9	Compliance & Audit	I	C	A	S	R		S	S	S	S	I	I	I									
10																							
11																							
12																							
13																							
14																							
15																							
16																							

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	PM - Program /Project Manager	**TTM** - Snr Tech Team Mgr	**PE** - Project Engineer	**TE** - Testing Engineer
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NOTE: Team Leaders responsibilities shall be those of the Site Manager w here no Site Manager is attached to the project.