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Technical Note - TN 044: 2016

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Subject: **Withdrawal of TMGA 1510 *Signalling Design Process for Projects Managed by Third Parties***

This technical note is issued by the Asset Standards Authority (ASA) to notify the withdrawal of TMGA 1510 *Signalling Design Process for Projects Managed by Third Parties,* version 1.5.

The processes and procedures associated with signalling design are now managed and assured through AEO internal processes and procedures, in accordance with the AEO's specific accreditation.

The requirements captured in the aforementioned standard are no longer applicable under the AEO assurance model; however, consideration should be given by AEOs to the former requirements in demonstrating best practice when producing internal processes and procedures for the production and management of signalling design.

Authorisation:

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Engineering Procedure

TMGA 1510

SIGNALLING DESIGN PROCESS FOR PROJECTS MANAGED BY THIRD PARTIES

Version 1.5

Issued 18 September 2012

Owner:	Chief Engineer, Signals and Control Systems		
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Document control

Version	Date	Summary of change
1.0	1 December 2009	New document – first issue based in TIDC document 'Rail Clearways Program Signalling Design Process', rev 1.7, dated 22 August 2007
1.1	18 January 2010	Add missing parts of 4.2.8(c) to 4.2.10((b)
1.2	30 March 2010	Updated flow chart figure 4. New document format applied as per TMA 400 Engineering Publications Manual.
1.3	4 March 2011	Aligned procedure with SPA 280, Process for Acceptance of Engineering Design
1.4	14 September 2012	Delete Appendices A, B & C plus delete references to these appendices
1.5	18 September 2012	Amended sections 4.3.13, 4.4, 4.5.5, & Figure 3.

Summary of changes from previous version

Summary of change	Section
reference to 4.2.12 in second last paragraph changed to 4.3. Last paragraph reference to 'Appendix C "Document Flow Process" ' changed to Figure 3.	4.3.13
Section 4.4, fourth paragraph changed 'Section 4.2.1' to Section 4.3". Fifth paragraph changed (refer section 5.3) to (refer section 5.6).	4.4
In the sentence immediately after the list items inspection in section 4.5.5 amended the reference to 4.2.12 to show 4.3.	4.5.5
Figure 3 in section 4.3 added text to note 1 at the bottom regarding "This includes an office copy for retention by the RailCorp Signal Design Office."	4.3 Fig. 3

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1 Introduction

This procedure outlines the process by which signalling design complies with the requirements of SPA 280, "Process for Acceptance of Engineering Design". It applies to work involving signalling design for RailCorp managed by external organisations. An external organisation that has been approved for managing works which involves signalling for RailCorp must:

- Plan and scope each project
- Define the interfaces
- Prepare work packages where appropriate
- Manage the delivery of the projects
- Handover the completed project to RailCorp.

Generally rail infrastructure projects impact in some way or another on the railway signalling system. The signalling design, documentation and implementation process is integral to maintaining the safe movement of trains and the integrity of the railway system.

Because of the high risk to the safety integrity of the railway system that can be caused by a signalling design error, the signalling design and documentation process differs to other railway disciplines e.g. civil, permanent way, and is unique to signalling.

This document describes the process for signalling design from concept through detailed design, construction, installation, test and commissioning and final as-built documentation. Signalling design is an active activity throughout each phase of the Works, from concept to commissioning.

2 Definitions

Term	Definition
Design Group	One or more signalling design engineers knowledgeable in railway signalling principles who are providing the design. The term 'Design Group' used within this document may be a contractor or consultant approved by RailCorp under the Engineering Authority process.
Reviewer	An experienced signalling design engineer familiar with NSW railway signalling principles and who may be part of the design team and is approved by RailCorp under the Engineering Authority process. This person shall have demonstrated experience with equipment type or technology used in the design.
Independent Design Verifier	A competent senior signalling design engineer that meets the requirements of a 'Reviewer' and who is independent from the design team and approved by RailCorp under the Engineering Authority process.
Design Approver	A RailCorp signalling engineer responsible for assessing a signalling design as acceptable for use in the RailCorp network and approved by RailCorp under the Engineering Authority process.
External Management Group	The external organisation managing the works with approval from RailCorp and responsible for all aspects of design and delivery.

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3 Design Obligations

The Design Group shall provide the signalling design for all stages of the Works, including design approval, construction, installation, testing and commissioning and final update of the Works. In providing the design the Design Group shall ensure that:

- The design is prepared, supervised and managed in accordance with the RailCorp Signalling Principles and Quality Procedures
- The design is prepared, reviewed and verified by individuals who are competent and have obtained Engineering Authority from RailCorp
- The design of the Works complies with the requirements of the Works Brief, Functional Specification Standards Drawings and other documents
- The design is accurately recorded in the design submissions including calculations, verifications, detailed construction drawings, specifications, test and commissioning plans and operation and maintenance manuals
- The design is reviewed and endorsed as compliant by a Reviewer prior to sending for verification
- The design is verified as compliant by an Independent Design Verifier prior to seeking approval from RailCorp.
- In the case of Computer Based Interlocking (CBI) data, the design shall have been set-to work and functionally tested prior to submission to RailCorp
-
- The design is developed and submitted for review in accordance with the Works Brief and agreed schedule.
- All design information, data, drawings and other documentation is produced for the Works in accordance with SPG703.

4 Design Development

Design development extends throughout the life of the project from concept to realisation of the new asset to form part of the railway. Figure 1 shows the following major activity phases and the requirement for design involvement throughout:

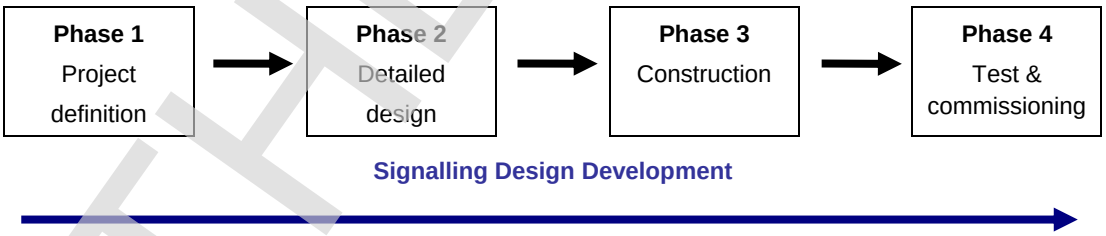

Figure 1 – Design development

4.1 Phase 1 – Project Definition

Project definition is developing the design concept for the project from pre-feasibility studies etc and is the initial design step in the project life cycle.

To prepare the signalling for the project works the design concept must be referenced within the Works Brief and include:

- The Signalling Functional Specification,
- Reference Design in the form of the Preliminary Signalling Plan, and
- Appropriate supporting documentation and drawings where necessary.

The signalling project definition process is shown in Figure 2.

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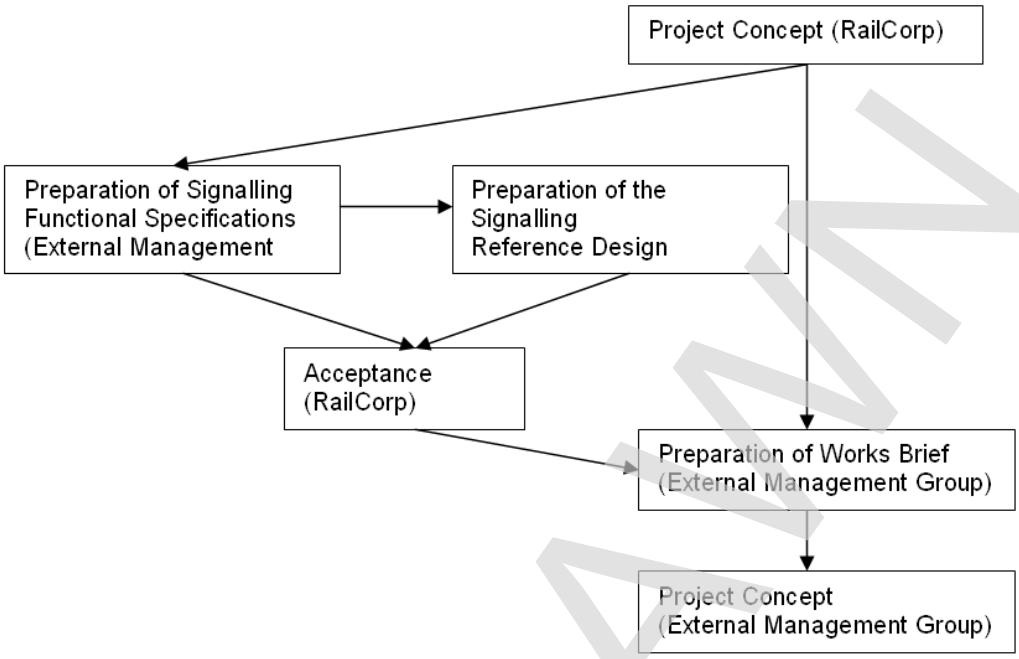

Figure 2 - Project definition process

4.1.1 Signalling Functional Specification

The purpose of the Signalling Functional Specification is to create a common understanding between the client, operators, maintainers and constructors on the scope of the new and altered signalling arrangements.

The external management group will develop a Signalling Functional Specification based on the requirements of RailCorp as defined in the User Requirements, Designer Brief and Operations Plan.

The Signalling Functional Specification will be prepared based on RailCorp QSDP44.

The Signalling Functional Specification will be submitted to RailCorp for acceptance.

The Works Brief will reference the approved Signalling Functional Specification.

4.1.2 Reference Design

The reference design is an intermediate step to assist in the development of the detailed signalling design. It shall describe, in an appropriate form, the requirements as an input into the detailed design stage. The reference design shall include:

- The Preliminary Signalling Plan,
- Control Tables if considered necessary, and
- Other information where it is deemed appropriate to assist in the preparation of the detailed design.

The Preliminary Signalling Plan will not be the final version but will indicate the broad concept of the signalling requirements following detailed discussions between the external management group, RailCorp signal design staff, operators and operations modelling of the reference design to ensure it's robustness to given timetabling requirements. The Signalling Plan will be finalised during the detailed design phase by the Design Group.

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The reference design documents will be included in the Works Brief.

4.1.3 Works Brief

The Works Brief is the contract document to describe the project Works prepared by the external management group and includes the signalling information that enables the Design Group to prepare and develop the design sufficient to construct, install, test and commission the signalling scheme. The Works Brief will include and reference the Signalling Functional Specification and Reference Design documents.

The Works Brief is used to tender the works where applicable culminating in the selection of a preferred supplier.

4.2 Phase 2 – Detailed Design

4.3 Design Process

The Design Group shall ensure the detailed design encompasses each Stage of the Works through to the delivery of the As-built documentation and drawings in accordance with the Works Brief.

Each Stage requires a submission of the affected design deliverable that shows the change to the existing installed signalling system functionality. The simplified process flow is shown in Figure 3.

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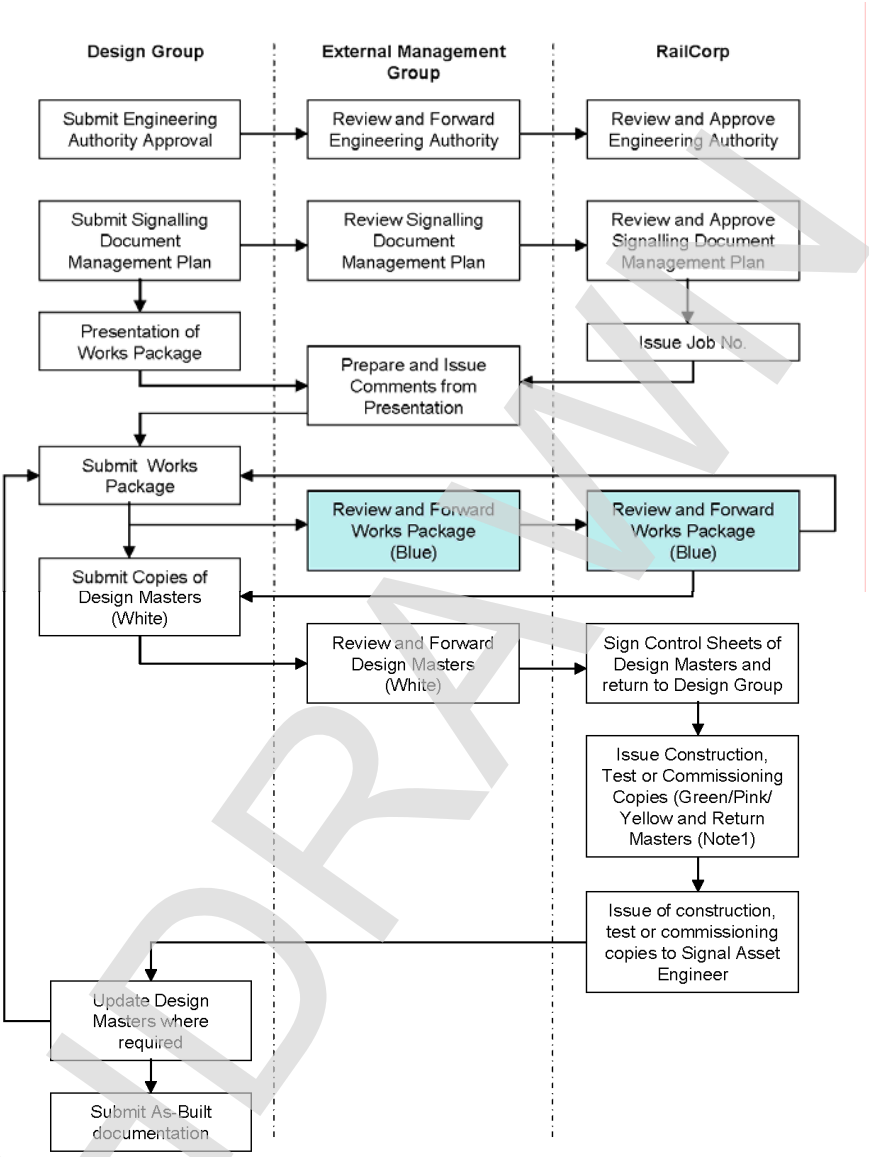

Note 1: Printing of the construction, test or commissioning copies performed by the design group. This includes an office copy for retention by the RailCorp Signal Design office. Refer also to QSDP 60 Process for Issuing Circuit Book Design to Site.

Figure 3 – Design Process

4.3.1 Existing As-built Documentation

Whilst recognising that signalling documentation is the property of RailCorp, the external management group will act as RailCorp's agent with the responsibility of ensuring signalling documentation integrity. The external management group will identify the person accountable and authorised to receive and issue signalling documentation. This person will be endorsed by the RailCorp Chief Engineer Signals.

The external management group will ensure:

a) The documentation is held securely.

b) The accountable person clearly understands their responsibilities.

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c) Documentation is not passed onto others without identifying and controlling the transfer.

d) When seeking signalling documentation clearly identify the purpose and status of the documentation, i.e. For Information or For Design.

e) To identify in conjunction with RailCorp Signal Design Office all other works that may impact on the documentation prior to the commencement of the detailed design.

f) Develop a plan in conjunction with RailCorp Signal Design Office the methodology to manage other works documentation. This may include the production of a sheet register and authorising changes to specific sheets only.

g) The request for CAD files to be issued by RailCorp only when required for detailed design.

The external management group shall fully document this process in the form of a Signal Design Management Plan (SDMP) for each project.

A job number will be issued for each stage of the design by the RailCorp Signal Design Section Head upon receipt of the SDMP. Additional signal design job numbers may be requested as required as stages of the works are identified.

4.3.2 Engineering Authority

Before detailed design can commence, the Design Group shall have submitted particulars of the design personnel to be used for the design via the external management group and obtained approval of the Engineering Authority by RailCorp

Failing to obtain Engineering Authority for all members of the Design Group may result in rejection of a design submission.

The nominated Reviewer and Independent Design Verifier shall also have Engineering Authority before any Design Works Package is submitted.

A Curriculum Vitae (CV) is required for each individual detailing recent experience particularly related to the equipment associated with the design. The Engineering Authority shall state the specific tasks to be performed for each individual. For the Independent Design Verifier, the Engineering Authority shall detail the degree of independence of the Independent Design Verifier and how this is ensured.

4.3.3 Design Deliverables

The design deliverables are submitted for each stage of the Works and shall include where applicable:

a) Signalling Plans

b) Control Tables and Aspect Sequence Charts

c) Track Insulation Plans

d) Vital and Non-vital Signalling Circuits

e) Detailed Site Survey Drawings

f) Signal Sighting Forms

g) Level Crossing Layout Plans

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h) Installation Drawings

i) Non-vital Control System Circuits

j) Vital Signalling Data

k) Difference Files

l) Non-vital Control System Data including MISS files

m) Mechanical Drawings

n) Clearance Diagrams

o) Power Supply Circuits

p) Design Integrity Tests

q) Drivers Diagrams and Weekly Notices

r) Analysis Checking copies

s) Air Reticulation Drawings

t) Control Panel Drawings

u) Process Checks of Review Copies

v) Test & Commissioning Plans

w) Operation & Maintenance Manuals

The detailed preparation of each design deliverable can be referenced in RailCorp Specification SPG 0703 'Signalling Documentation and Drawings'.

4.3.4 Design Works Packages

The design deliverables can be broken down into a number of discrete Works Packages. The purpose of this is to separate the design deliverables into manageable submissions that permits the check and verification steps to be processed logically.

The quantity and configuration of the Design Works Packages is dependant on the work scope size and complexity. For efficiency, a Design Group may decide to bundle a number of design outputs into a single Design Works Package whereas in another project it may be more prudent to increase the number of Design Works Packages. The proposed number of Design Works Packages and deliverables within each Design Work Package rests with the Design Group with endorsement from the external management group and RailCorp Signal Design Office.

An example of a set of Design Works Packages for a single Stage submission may be established as in Table 1.

Design Works Package No.	Design Deliverables
1	a) Signal Plan b) Control Tables
2	a) Track Insulation Plan b) Cable Route Plan (sometimes called DSS)

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Design Works Package No.	Design Deliverables
3	a) Circuit Books b) Trackside Equipment Layouts c) Trackside Insulation Design d) Mechanical Design e) Weekly Notice and Driver Diagram
4	a) Test and commissioning Plan
5	a) Operation and Maintenance Manuals
6	a) Computer Based Interlocking Data (where applicable) b) Simulation data (where applicable)
7	a) As-Built Documentation

Table 1 - *Examples of design works packages for single submission*

4.3.5 Design Works Package Register

The design deliverables applicable to each stage of the Works shall be progressively submitted, via the external management group, for review and approval by the RailCorp Signal Design Office.

A detailed Design Works Package Register detailing the design submissions shall be developed by the Design Group and submitted to the external management group who will discuss with RailCorp and respond with consolidated comments within twenty one (21) days.

The Design Works Package Register shall detail the following:

a) Design Works Package number

b) The Stage to which the Work Package applies

c) The title of the Design Works Package

d) A brief description of the content of the Design Works Package

e) Planned, Scheduled and Actual Submission Dates.

The Design Works Package Register shall be submitted monthly to the external management group showing for each Design Works Package the:

a) Planned date of submission

b) Forecast date of submission

c) Actual date of submission.

After endorsement of the initial first submitted Design Works Package Register by the external management group.

RailCorp will allocate a Job Number to each Stage of the project (where each Stage may have a separate set of design deliverables). The Job Number is for traceability of the design within RailCorp. The allocated number shall be clearly stated on all Design Works Packages (refer to the Documentation Section 5).

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4.3.6 Design Work Package Submissions

With each Design Works Package submission the Design Group shall prepare the following:

- Design Report
- Design Certification
- Design deliverables as defined in the Design Works Package Register.

Each submission shall be forwarded under transmittal to the external management group who will resister the submission.

Design submissions for Rail Corp approval (Excepting Test & Commissioning Plans and Operations and Maintenance Manuals) shall be submitted as three (3) copies on Blue paper and follow the submission cycle. One electronic copy shall also be submitted.

4.3.7 Design Report

The Design Group shall prepare the Design Report to demonstrate that the requirements of the Works Brief have been incorporated into the Design Works Package. The Design Report shall include where applicable:

a) The scope of the Works covered by the Design Report,

b) A Compliance matrix demonstrating design compliance against the Works Brief and the Signalling Functional specification,

c) A list of all design deliverable and version status,

d) Design studies undertaken to demonstrate compliance with the requirements of the works Brief,

e) Calculations including Braking Distance and Overlap,

f) Enabling, staging and sequencing information,

g) Construction methodology;

h) Review and confirmation that the works can be undertaken during scheduled possessions,

i) Equipment schedules that identify long lead items or those affected by other interface parties,

j) Equipment Authority approvals for design personnel used in the preparation of the design,

k) Design input components,

l) Identification of relevant and applicable standards, codes and guidelines, including reference to the provisions and criteria and classification assumed within such documents,

m) Interfaces and interface works including the delineation of responsibility.

The Design Report shall be updated and submitted as part of each Design Works Package submission.

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4.3.8 Design Certification

The Design Group shall certify that each design deliverable has been designed, reviewed and verified in accordance with the requirements of the Works Brief and RailCorp Quality signalling Design Procedures (QSDP). The design certification shall be provided as follows:

a) The signature of the Design Group Designer and the Reviewer on the Control Pages of the Circuit books,

b) The signature of the Verifier on all design deliverables.

4.3.9 Review and Independent Design Verification

The Design Group shall arrange for the review and independent verification of the design. The review shall be undertaken by the Reviewer. The verification of the design shall be undertaken by the Independent Design Verifier who is independent from the signalling design team and Reviewer.

The review and independent verification shall be undertaken in accordance with RailCorp QSDP and includes:

a) Ensuring all relevant plans and drawings required for the design have been supplied,

b) A check of the Signalling Plan conformance with the Signalling functional Specification, Works Brief, RailCorp signalling principles and standards,

c) A check of the Track Insulation Plan for conformance with the Signalling Plan and RailCorp signalling principles and standards,

d) A check of the Control Tables to ensure operational and safety requirements are included and conformance with appropriate RailCorp signalling principles and standards,

e) A check of the locking diagram (where applicable) for agreement with the Control Tables and conformance with mechanical locking principles,

f) A check of the signalling circuits for:-

- Conformance with signalling shown on the Signalling Plan,
- Inclusion of all required interlocking and track circuit controls including a check against the Control Tables,
- Inclusion of all train operating safety requirements,
- Conformance with applicable RailCorp circuit design standards.

g) A check of computer interlocking data for conformance with Control Tables and applicable RailCorp standards,

h) A check of the power supply design for: -

- Required power supplies at each location,
- Adequate protection requirements,
- Conformance with RailCorp standards.

i) A check of the mechanical design for conformance to RailCorp principles and standards,

j) A check of interfaces with existing signalling to ensure completeness, continuity of operation and conformance with RailCorp signalling principles and standards

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k) A check of other documents that are part of the design for the project e.g. indicator diagram and control panels, for conformance with appropriate RailCorp practices and standards.

4.3.10 Design Presentations

When requested, the Design Group shall present the design package for each Stage to the external management group and RailCorp personnel. The presentation shall be in an open meeting type format permitting RailCorp and the external management group to gain an understanding of the design and philosophy adopted and an opportunity to discuss the design with the Design Group and other project team members where applicable.

The presentations shall address the following:

- Meeting the requirements of the Works Brief and Signalling Functional Specification,
- Safety issues for construction
- Interfaces, both physical and communicative,
- Constructive, test and commissioning issues
- Design Works Packages
- Equipment and material procurement,
- Key issues and assumptions.

The Design Group shall nominate in the Design Package Register the time for the presentations of each stage to the external management group for their review and comment. The design presentation locations and final timing will be the responsibility of the external management group.

4.3.11 Design Masters

The Design Group shall maintain a Design Master set of the design as the design develops through the Stages.

The Design Master Copy shall be submitted with the Design Works Package submission after RailCorp approval. The accompanying Control Sheets shall be signed by the Design Group, Reviewer and Independent Design Verifier and will be counter-signed by the Design Approver and the RailCorp Chief Engineer Signals.

On receipt of the signed Design Master Copy Control Sheets, the Design Group shall print copies, when appropriate, of the construction (Green) test (Pink) and commissioning (Yellow) documentation and drawings. The number of copies and the process for issuing the design documentation is contained in SPG 0703.

The Design Group is permitted to make additional copies of the signalling documentation for their use. All copies required for the construction, test and commissioning team shall be prepared from the Design Masters and signed Cover Page and Control Sheets.

4.3.12 Weekly Notice and Drivers Diagram

For each signalling stage work, a weekly notice and drivers diagram will be required to be published. This document details the configuration changes to the signalling infrastructure which will be commissioned in the possession. Changes to track configuration including speed boards will be required to be published in a separate track weekly notice via RailCorp Track Design section.

The document will be signed as prepared, reviewed and independently verified by the Design Group and be submitted as hard copy for RailCorp approval via the external

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management group. Once approved, a soft copy will be submitted to RailCorp for publication.

The weekly notice will be required to be submitted to RailCorp for approval 6 (six) weeks prior to the stage commissioning.

4.3.13 Design Amendments

Amendments to the design shall be submitted for approval by RailCorp, via the external management group, for all changes to signalling functionality. The amended documentation shall be BLUE in colour and three (3) copies are to be submitted.

Amendments for non functionality changes e.g. additional details such as terminal numbering where there is no version change are not required to be submitted for approval however the Design Master shall be updated.

When an approved issued design is to be altered the original version date on the sheet is to be crossed out but remain legible. The altered area is to be clouded and the cloud marked with the new version date. It is preferable that these changes are neatly drawn by hand as this makes them more obvious.

The Design Group shall provide a new Control Sheet with the changed sheet version dates updated and the Control Sheet version date also updated.

The Reviewer and the Verifier shall check the alterations before submission for approval. The Reviewer and the Verifier are responsible for ensuring that all elements of the change are correctly altered to the extent that the change requires.

The Design Group shall follow the same process as described in 4.3 above for design amendments.

The process for the issuing, approving and distributing the design documents is contained within Figure 3 and SPG 0703.

4.4 Phase 3 - Construction

Once the design has been approved and accepted by RailCorp the RailCorp Regional Asset Engineer shall issue the 'Construction Copy' to the external management group for forwarding to the Design Group.

Construction Copies shall be printed on GREEN paper to differentiate them from other documentation.

The Design Group shall prepare eight (8) copies for RailCorp use and any additional Construction Copy copies on GREEN paper as required.

When the Construction Copy has been issued, no alteration shall be made to the Construction Copy documentation except by amended documentation issued for approval in accordance with the detailed design process as outlined in Section 4.3 above. The amendment submission shall include amended and signed Control Sheets.

When construction personnel receive updated signalling documentation and drawings duly authorised by RailCorp (refer section 5.6) they shall arrange for all field copies to be promptly updated with the new sheets.

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4.5 Phase 4 – Test and Commissioning

4.5.1 Commissioning Engineer

RailCorp will appoint a Commissioning Engineer at the appropriate time during the construction phase to oversee all testing and commissioning activities and manage and coordinate the preparation and operational readiness of the Works.

The Commissioning Engineer will work with the Design Group and testing and commissioning team to ensure the approved design has been implemented and tested appropriately.

The Commissioning Engineer will ensure that prior to commissioning the documentation is current with the latest Control Sheet and all pages are correct to that Control Sheet. The Commissioning Engineer will ensure that all testing including wire counts, bell tests and null counts are completed before the design is brought into use.

A Signal Commissioning Number for each commissioning works package shall be issued by the Commissioning Engineer. Additional numbers may be allocated as required for each stage of the works as they are identified.

4.5.2 Test and Commissioning Plan

The Design Group shall prepare a Test & Commissioning Plan in accordance with the Works Brief. The plan shall detail all aspects of the testing and the commissioning to ensure the signalling system is installed, tested and commissioned in accordance with the approved design and that maintains the safety and integrity of the system.

4.5.3 Operation and Maintenance Plans

The Design Group shall prepare any equipment Operation & Maintenance documentation in accordance with the Works Brief. The documentation shall detail all aspects of the equipment operation and maintenance to provide the RailCorp maintenance personnel with the necessary detailed information to maintain the equipment and ensure the signalling system availability, safety and integrity is maximised.

4.5.4 Testing

At the appropriate time RailCorp will issue the signed Control Sheets for the 'Testing Copy' to the Design Group for the production of the Testing Copies. Testing Copy drawings and documents will be based on the Construction Copy and Design Master and will include any amendments.

The Design Group shall prepare eight (8) copies for RailCorp use and any additional Testing Copy copies on PINK paper as required. The Test Copy drawings and documents will be based on the Construction Copy and Design Master and will include any amendments.

The process for the issuing, approving and distributing the design documents is contained within SPG 0703.

Test Copies shall be printed on PINK paper to differentiate them from other documentation in accordance with RailCorp Specification SPG 0711.

Only Test Copy documentation shall be used for compliance testing.

When the Test Copy has been issued, no alteration shall be made to the Test Copy documentation except by amended documentation issued for approval in accordance

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with the detailed design process as outlined in Section 4.2.1 above. The amendment submission shall include amended Control Sheets.

On completion of the testing a Test Copy Master shall be assigned and each page signed off by the Tester in Charge to certify that they accurately represent the approved, tested status of the signalling installation.

When testing and commissioning are undertaken at different times the Test Copy Master shall be used to update the Design Master for the commissioning documentation and returns for the Commissioning.

4.5.5 Commissioning

The Design Group and the testing and commissioning team shall:

a) Prior to commissioning, provide the design closure list of the total set of approved design documents and drawings to which the installation has been designed

b) Provide commissioning notices for review and distribute sufficient approved copies at least seven days prior to the commencement of the commissioning for all personnel involved in the commissioning

c) Provide the final Design Master of the Drivers Diagram at least ten weeks prior to the commissioning

d) Deliver the prepared advertising notice for the Circular or Weekly Notice at least nine weeks prior to the commissioning

e) Provide the asset register, in the RailCorp approved format, two weeks prior to the commissioning

f) Provide the applicable Operations and Maintenance Plans two weeks prior to the commissioning

Commissioning copies shall follow the same process as described in 4.3 above.

At the appropriate time RailCorp will issue the signed Control Sheets for the 'Commissioning Copy' to the Design Group via the external management group. Commissioning Copy drawings and documents will be based on the Construction Copy and Design Master and will include any amendments.

The Design Group shall prepare thirteen (13) copies for RailCorp use and any additional Commissioning Copy copies on YELLOW paper as required. The Commissioning Copy drawings and documents will be based on the Testing Copy and Design Master and will include any amendments.

The process for the issuing, approving and distributing the design documents is contained within SPG 0703.

Commissioning Copies shall be printed on YELLOW paper to differentiate them from other documentation in accordance with RailCorp Specification SPG 0711.

One Commissioning copy shall be the Certified Office Copy (COC).

Modification Sheets shall only be used during the commissioning when the preparation of designs in the formal process of approval using Control Sheets is impractical. Modifications during a commissioning may only be undertaken when no other recourse is available and only by the approved Engineering Authority with agreement from the RailCorp Design Engineer in-charge and Commissioning Engineer. The Commissioning

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Engineer shall ensure all Modification Sheets are recorded in the commissioning log and securely stapled into the COC.

The COC shall be updated with all new and amended pages inclusive of Control Sheets and with all Modification Sheets until the work is satisfactorily compliance tested and commissioned.

On completion of the commissioning the COC shall have each page signed off by the Tester in Charge and Commissioning Engineer to certify that they accurately represent the approved, installed, tested and commissioned status of the signalling installation.

Following production of the Maintenance Copies, the Design Group and design engineer in charge shall endorse the COC and copy of the updated Maintenance Copy with their name, signature and date to certify that the final documentation has been correctly updated and compiled before submission to RailCorp.

The Commissioning Engineer shall return the COC to the RailCorp Design Office via the Asset Engineer. A copy of the COC shall be retained by the Design Group for the purpose of updating of the as-built documentation.

A sufficient number of Interim Maintenance Copy generated from the COC as agreed shall be prepared for maintenance personnel and the RailCorp Plan Room records.

5 Control of Drawings and Documentation

5.1 Purpose of Drawing and Documentation Control

Signalling documentation describes the safety critical elements of the system that controls the operational safety of all train running. It is strategic and safety critical.

The RailCorp Signal Design Office controls the drawing and documentation to ensure that issued designs do not conflict and that the status of the documentation is clearly identified as approved for its purpose of site clarification, construction, testing commissioning and maintenance.

For any site, signalling documentation describing the system may be in one of the following forms:

- Current As-Built
- Work Commissioned but not included in the As-Built
- Work under construction
- Work under design

Signalling documentation is the property of RailCorp and it is the direct responsibility of the RailCorp Signal Design Office to control the signalling documentation, however, both the external management group and the Design Group have a responsibility to control and maintain documentation entrusted to them.

5.2 Forms of Signalling Documentation

Signalling documentation may be provided in various forms such as:

a) Plastic tracings

b) Paper Copies

c) TIFF files

Withdrawn - for reference only

d) CAD files

e) Vital and Non-vital Data

Issued paper copies will be identified as “For Information Only”. TIFF files will be created as uncontrolled. CAD file status can be checked against the version date and time embedded in the file and identified on signed Control Sheets.

It is not proposed to issue master tracings.

Tracings and CAD files are required for the maintenance of As-Built documentation.

5.3 Documentation Control Mechanism

Designs shall be produced such that the status of the design is readily apparent to all persons reliant upon the design. They shall:

a) Identify the documentation that details the designed configuration of an installation at a specific time

b) Methodically manage authorised alterations to that configuration, and

c) Clearly match review, verification and approval to the design configuration.

To achieve this:

d) Each distinct commissioning configuration (Stage) shall have a different Job Number and all documents associated with the Stage shall have the same Job Number. Job Numbers are issued by RailCorp Signal Design Office.

e) Every page of the Circuit Book shall include the Circuit Book number, Job Number, page number and version date showing the date the design was last altered.

f) Circuit Books shall have a unique number and every page of the book shall include the Circuit Book number and page number.

g) A Control Sheet shall be produced for each Job listing all pages of all signalling design documents (i.e. signalling plans, track insulation plans etc). The Control Sheet shall be kept current and record the version date of each sheet or document and the version date of the Control Sheet.

h) All changes to documents shall be highlighted and version dating recorded on the document. Subsequent changes shall be highlighted using clouds with the version date shown. Clouds are only used for that version date (i.e. when a further update occurs, previous clouds are to be removed).

5.4 Documentation Flow

Signalling documentation and drawing is designated as follows:

a) For approval Copy (BLUE)

b) Design Master (soft copy only)

c) Design Master Copy (soft copy only)

d) Construction Copy (GREEN)

e) Test Copy (PINK)

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f) Test Copy Master and Teat Copy Master Duplicate (PINK)

g) Commissioning Copy (YELLOW)

h) Certified Office copy (COC)

i) Interim Maintenance Copy (YELLOW)

j) As-Built or Office Copy (White)

The flow of the diagram is shown in Figure 4.

All documentation and drawings shall be prepared and submitted in the hard copy format excepting the Design Master and Design Master copy.

The Design Master and Design Master Copy are prepared and submitted in soft copy files only.

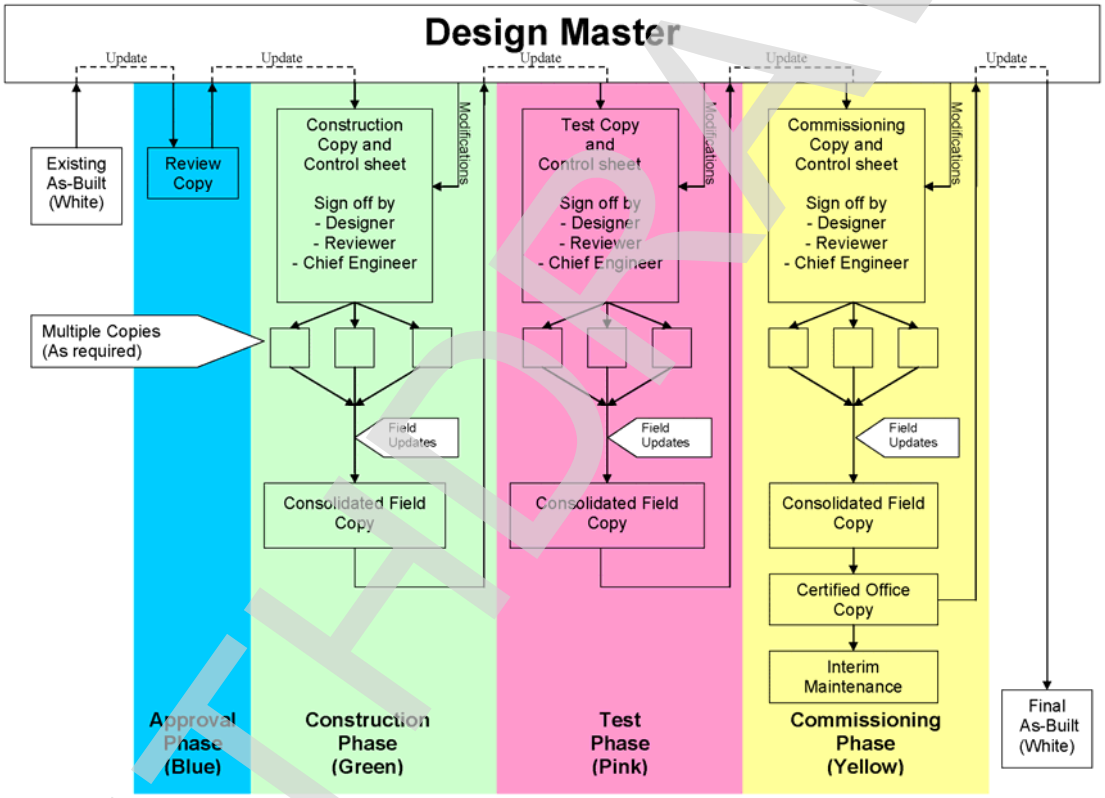

Figure 4 – *Design documentation flow*

5.5 Coloured Documentation

The use of coloured documentation for the various submissions is intended to assist in document control. When updating a design from GREEN to PINK to YELLOW the sheet version date shall not change unless the design has been amended. The adding of detail by field personnel to clarify or further detail a design is not a change to the design. Where wiring is physically altered it represents a design change and the amendment shall be given a new version date, the Control Sheet updated, reviewed, verified and approved in accordance with the process outlined in 4.2.1 above.

Withdrawn - for reference only

When updating between different colour issues the front cover of the Circuit Book shall be signed by the Design Group to indicate the status and that it is ready for release.

5.6 Amending Circuit Books

Circuit Books, where new sheets are issued together with a new approved Control Sheet, shall be updated by insertion of the new sheet into the Circuit Book. Old versions of the updated sheet shall remain in the Circuit Book but shall be cancelled by drawing a RED Line diagonally across the page. Old versions of the Control Sheet shall also remain in the Circuit Book as these are the record of the review, verification and approval, however these shall be cancelled by drawing a RED Line diagonally across the page.

Should alterations be required on a sheet that already contains amendments, the version date shall be crossed out (but remain legible) and any existing clouding removed. The new amendments shall be made and clouded with the sheet given a new version date. The Control Sheet shall be updated and alteration reviewed, verified and approved. The previous sheet remains in the Circuit Book but cancelled by drawing a RED Line diagonally across the page.

Once wiring has commenced, amendments to the design may need to show wires that are not yet installed, that they need to be removed. In these circumstances the redundant wires shall be show highlighted by a hollow arrow and the new wires highlighted as solid arrows.

5.7 Final As built Drawings and Documentation

The Design Group shall provide:

a) The handover of all final Design Masters and final print copies of drawings and documents correct in accordance within twenty eight days of commissioning.

b) Any other data and information required for RailCorp GIS system in the format as stipulated in the Works Brief.

c) Within seven days of advice of acceptance of the final drawings and documents, new or altered drawings with a common related version number and date, reproducible including all negatives, master and duplicate master software, plus three prints of all documents and drawings attesting they are in accordance with the Works Brief requirements.

d) After commissioning of each stage within the time period specified in the Works Brief, three white copies of all related drawings and documents plus a soft copy of all digitised design documentation amended to the design.

e) The Certified Office Copy (COC) that has been signed by the Design Group and the Approver of each drawing and document to certify that the final documentation has been updated and accurate to the approved design and commissioned installation.

f) Signed Masters that verifies the documentation is to the COC.

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