

Engineering Drawings and Documentation

EGP-04-01

Applicability

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SMS

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1.2	14 Oct 15		Document rebranded
1.3	9 May 16	3.1, 3.2 & 3.6	Further detail added regarding approval of drawings, including addition of approval information on drawing templates

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2.0	17 Nov 17	Various	Addition of requirement for combined pdf file of updated master records included to standardise requirement across all disciplines and in line with new DMS system requirements. Addition of note regarding update of drawings when infrastructure is decommissioned. Also clarification of requirement for As Commissioned drawings for civil and structures works and the revision format on drawing templates. Clarification of the timeframes for supply of drawings. Addition of naming convention for scanned NSW signal drawings.
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1 Introduction

1.1 Purpose

This document sets out ARTC's standards, practices and procedures for the preparation, presentation and use of drawings and documentation required for new and altered infrastructure.

1.2 Procedure Owner

The Configuration Manager is the Procedure Owner and is the initial point of contact for all queries relating to this procedure.

1.3 Overview

Engineering drawings and related documentation are required to show how infrastructure has been designed and constructed and are part of the permanent records of our organisation as required by law. They are used for maintenance purposes and to enable repairs to be performed in the event of an accident, structural failure or natural event which has caused damage to our infrastructure. They provide vital information required by ARTC for the safe use of our infrastructure by our customers.

The ARTC Drawing Management System (DMS) holds drawings relating to ARTC infrastructure and reference copies of drawings for other infrastructure contained within the rail corridor.

- As Designed / Issued for Construction
- As Commissioned
- As Built

Drawings of ARTC infrastructure are required for each of the engineering disciplines. The types of drawings applicable to these disciplines include but are not limited to:

Signals

- Circuit Book
- Control Panel
- Control Table
- Drivers Diagram
- Locking Table
- Signalling Plan
- Track Insulation Plan

Track and Civil

- Cross Section
- General Arrangement
- Horizontal Alignment
- Locality Plan and Schedule of Drawings
- Longitudinal Section
- Survey
- Track Layout

Structures

- General Arrangement
- Elevations
- Sections
- Details
- Locality Plan and Schedule of Drawings

Electrical

- Location

1.4 Definitions

The following terms and acronyms are used within this document:

Term or acronym	Description
Design Interface Agreement	An agreement detailing the roles and responsibilities of multiple parties required to work together to achieve complete and accurate update of drawings which reflect the changes associated in multiple simultaneous works.
Drawings	Drawings shall be defined in this context as site specific or standard documented layouts, plans, diagrams, tables, schematics and the like that set out the design and/or configuration of infrastructure assets (e.g. physical dimensions and composition, temporal and/or spatial arrangements, physical and/or logical interconnections) either existing, pre-existing, or proposed.
DMS	Drawing Management System
DoT	Department of Transport Victoria - The Department of Transport (DoT) is a government department in Victoria, Australia. It's responsible for ongoing operation and coordination of the state's transport networks, as well as the delivery of new and upgraded transport infrastructure.
PTV	Public Transport Victoria - administers and operates the Victorian Drawing Management System on behalf of the Department of Transport Victoria (DoT) to provide a central repository for technical infrastructure drawings, engineering standards, and configuration data for the Victorian Transport Industry.
PTV Drawing Certifier	This person certifies that the drawing is an accurate representation of actual as-in-service conditions when uploading drawings into the Public Transport Victoria drawing management system. This person is not certifying the design.
PTV Drawing Authoriser	The person nominated from within an Accredited Rail Transport Operator organisation that is responsible for authorising the booking in of As-Built drawings into the PTV Drawing Management System.

1.5 Applicable Documents

This standard shall be read in conjunction with the project specification, any general conditions attached thereto and other standards and documents comprising the Contract.

In particular, this standard shall be read in conjunction with the following publications:

- Australian Standard AS1100 Technical Drawing
- AS13567 Technical Product Documentation Organisation and Naming of Layers for CAD
- EGP-04-02 Drawing Management System
- ESD-25-01 CAD and Drafting Manual for Signalling Drawings
- EGP0401F-01 Drawing Alteration Request – Field and Other Alterations
- EGP0401F-02 Drawings for Submission Checklist
- EGP0401F-03 Maintenance Copies Drawings Transmittal

- EGP0401F-04 Design Interface Agreement Template
- EGP0401F-05 Request for Drawings
- EGP0401F-06 Signal Data Submission
- EGP-01-03 Engineering, Design and Project Management Identification of Competence
- ESC-21-03 Inspection and Testing of Signalling – Inspection and Testing Principles
- ESI-05-14 Signal Design and Maintenance of Configuration Information
- SCP 06 Signalling Documentation and Drawings
- EGP-03-01 Rail Network Configuration Management

2 Drawing Management Systems

2.1 ARTC Drawing Management System

The ARTC Drawing Management System (DMS) holds drawings relating to ARTC infrastructure (e.g. signalling, track, civil, structures, etc).

It also contains reference copies of drawings for other infrastructure contained within the rail corridor where applicable (e.g. under bores, third party infrastructure, etc).

Drawings at each of the different stages of the infrastructure design and installation process are stored in the DMS:

- As Designed / Issued For Construction
- As Commissioned
- As Built

Drawings in the ARTC DMS are managed by the *DMS Administrators*.

Requests and updates are processed electronically through the DMS.

EGP-04-02 ARTC Drawing Management System contains detailed information on using the ARTC DMS.

2.2 Victorian Drawing Management System

For all ARTC infrastructure in the *State of Victoria*, drawings are required to be stored in the drawing management system managed by the Public Transport Victoria (PTV) on behalf of the *Victorian Department of Transport (DoT)*.

This is a lease requirement placed upon ARTC under the Interstate Infrastructure Lease with PTV and must be adhered to.

Drawings relating to infrastructure in Victoria shall adhere to the following requirements:

- ***As Built drawings only*** are required to be stored in the *PTVDMS*.
- PTV Infrastructure Drafting Standards must be followed.
- PTV Drawing Management System processes are to be followed for booking in and out drawings and registering new projects.
- Drawing numbers are issued by PTV.

- Drawing templates are supplied by PTV.
- Access to the PTV DMS is provided via a request to PTV.
- PTV Infrastructure Drafting Standards do not allow signatures to be on CAD drawings. Names for drawer, designer, checker, independent review and approver are to be the initial of the first name and full last name (e.g. J CITIZEN).
- For single sheet drawings, two pdf copies are to be uploaded with the CAD file. The first pdf to be an exact clean copy of the CAD file. The second pdf copy to include the Drawing Certifier's name (in uppercase letters), date and the Drawing Certifier's handwritten signature in the area provided on the top left-hand corner of the Title Block. The certifier is certifying that the drawing is an accurate representation of the actual as-in-service conditions. For more information, and for multiple sheet drawing requirements, refer to the PTV Infrastructure Drafting Standards.
- Following commissioning, any outstanding or updated drawings must be booked back into the PTV DMS within 30 days, similar to the requirements of the ARTC DMS. This applies for maintenance, projects or third party works.

As handwritten signatures aren't permitted on drawings in the PTV DMS, the normal process for signing drawings for ARTC independent review, approving, and accepting are exempt for PTV infrastructure drawings. The independent review, approving and accepting process must still be followed, however handwritten signatures are not required on the drawings. Evidence of these processes being undertaken may include emails or separate signing sheets created by the project team. These records are to be stored with project records and available on request.

As-Designed / Issued-For-Construction and As-Commissioned drawings should also follow the PTV Infrastructure Drafting Standard and also do not require handwritten signatures for the independent review, approving and acceptance process. Evidence of these processes being undertaken is also required as described above.

As-Designed / Issued-For-Construction, and As-Commissioned versions of drawings relating to Victoria are not held in the PTV DMS. These drawings shall be held in the ARTC DMS for reference purposes but will not be relied upon as the most current version.

PTV requires certain roles to be fulfilled when working with their DMS – Drawing Authoriser, Drawing Certifier and Drawing Controller. The following table outlines the roles required to be assigned from the Corridor and/or project, registered with PTV and training undertaken from PTV to fulfil these roles.

For further information contact PTV via:

- Email - dms@transport.vic.gov.au
- Website - <https://dms.ptv.vic.gov.au>

NOTE: *The following roles and responsibilities table has been taken directly from the PTV Drawing Management System Process document (PTV-NTS-012:2018, Version 1, Released 27 Aug 2018) so may be subject to change. Please contact PTV for the latest version.*

PTV DMS Roles	Qualifications	Responsibilities
<i>Drawing Authoriser</i>	<p>Must be an employee nominated by Operator</p> <p>Must have the knowledge, technical skills and experience associated with the discipline specified</p> <p>For Signalling Diagram: must be Rail Safety Manager, Incidents Safeworking Manager or equivalent position within relevant Accredited Rail Transport Operators</p>	<p>Authorise for the drawings to be booked into DMS by confirming that:</p> <ul style="list-style-type: none"> i. a competent organisation or person produced or updated the drawings. ii. a competent person controlled the commissioning and certification that the contents of the drawings reflect as-in-service. iii. the project and/or commissioning of new/updated infrastructure have reached the point where it is appropriate for the new/updated drawings to be published to DMS. iv. action has been taken to have superseded drawings withdrawn from active DMS Vaults.
<i>Drawing Certifier</i>	<p>Must be approved by Operator Drawing Controller or Authorisers of relevant organisation within the rail industry</p> <p>Must have the knowledge, technical skills and experience associated with the discipline specified</p> <p>Must provide assurance to the reasonable satisfaction of the relevant Drawing Authoriser</p>	<p>Certify drawings are an accurate representation of actual AIS condition in field.</p> <p>Certify drawings are prepared in accordance with the PTV Infrastructure Drafting Standard.</p> <p>Insert signature in accordance with the PTV Infrastructure Drafting Standard.</p>

<p><i>Drawing Controller</i></p>	<p>Must be an employee of Operator or Authority</p> <p>Must be approved by an Operator Drawing Authoriser</p>	<p>Confirm the drawings are required to be booked out and approve Book Out Request.</p> <p>Confirm the drawing number is required to be assigned and approve Drawing Number Request.</p> <p>Ensure that the drawings booked out are in a controlled and safe environment.</p> <p>Must only book out drawings for area of work.</p> <p>Ensure drawings are booked back in as soon as they are no longer required for design alterations.</p> <p>Arrange for drawings to be certified, authorised and booked into DMS.</p> <p>Ensure Operator approved person controlled the commissioning and certification that the contents of the drawings reflect as-in-service.</p> <p>Ensure that Drawing Certifier has relevant competencies to undertake certification and understands their role and requirements of the process</p> <p>Ensure that details of superseded/obsolete drawings withdrawn from active DMS Vaults.</p> <p>Any specific requirement to advise other parties of the return of drawings has been identified.</p>
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3 Projects / Maintenance Requirements

3.1 General Requirements

The production and delivery of new and/or altered drawings that fit into ARTC's existing drawing series to form a comprehensive, consistent and cohesive set. They are to follow ARTC's standard documentation and drawing practices, including drawing numbering. Refer to procedure EGP-04-02 ARTC Drawing Management System for further information on drawing numbering.

If it is necessary for other existing drawings, not directly affected by the works, to be renumbered or otherwise modified to achieve an ordered, consistent and cohesive set, those drawings shall also be included in the work under the Contract and shall be modified to comply with these requirements.

All documents and drawings being used at any time are to be the latest version and the appropriate copies for the purpose required.

Drawings are to include notes relating to any deviation from standards and are to include the waiver number that authorised the deviation.

Drawings are required to be supplied for each stage of the project or activity as follows:

As-Designed / Issued for Construction (IFC)

These drawings are to be supplied as individual editable files as described in section 4.1.

A combined pdf set of each master file is also to be accepted on behalf of ARTC by the project manager and supplied for inclusion in the DMS as detailed in section 4.6.

As-Commissioned / As-Constructed (Mark-up Copy)

These drawings are the marked up hard copies of design drawings signed by delegated personnel (preparers of drawings and acceptance by ARTC) and scanned into a single file.

These are updated to the DMS as well as being used as interim maintenance copies.

An acceptable alternative is the design drawing file, applicable Drawing Change Notes and the Drawing Change Note Register.

For civil and structures works where no changes to the Issued for Construction file have been required during the construction phase, As Commissioned drawings will not be required to be supplied for update to the DMS. For audit purposes, a note shall be included in the relevant project management checklist or plan to indicate the reason these files were not required as a deliverable from a particular project.

As-Built / Work as Executed (WAE)

These drawings are the individual As-Designed CAD version drawings updated to include all changes required during the construction and commissioning phases of the project or maintenance activity.

A combined pdf set of each master file is also to be accepted on behalf of ARTC by the project manager and supplied for inclusion in the DMS as detailed in section 4.6.

NOTE: *Projects or maintenance activities involving decommissioning of redundant infrastructure need to consider any related drawings and ensure that the files are archived in the DMS and their metadata is updated to indicate the reason for this change in status.*

3.2 Configuration Management Requirements

All drawings shall be subject to version control. Each revision shall be clearly shown on the drawing with its own revision number / letter, date and the description of the changes involved.

If a drawing is superseded for reasons other than a revision update, this shall also be indicated on the drawing with reference to a new drawing number if applicable.

All metadata relating to the drawings shall be completed and supplied on the standard ARTC template provided with the issued drawings and / or new drawing numbers.

Transmittal of all documents and drawings requires a standard transmittal form detailing the issue and following up receipt acknowledgments.

Note: Transmittals for drawings issued for update will be generated in the ARTC DMS.

A drawing register is required to keep track of all drawings and copies of drawings issued for work under the Contract, showing all identification details of each drawing issued (e.g. drawing number and/or title, type of drawing, purpose of copy, version number and date, copy number, copy holder name and receipt acknowledgment, issue date, history and current status).

3.3 Design Requirements

ARTC requires submission of design drawings for consideration prior to commencing construction or maintenance work. The design drawings shall be signed by the contractor's designer, checker, independent reviewer / verifier and design approver and accepted by ARTC before construction commences.

Where the specialised nature of the design requires checking of particular portions by different individuals, then the contractor must allocate a checking representative that is responsible for the review of the overall design.

Construction will be authorised to commence once any corrective action required to the review copies has been performed, signed off and accepted by ARTC (in accordance with requirements of original submission).

To assist with procurement of items, a bill of materials in design drawings is encouraged.

Assessment of competence may be issued by qualified assessors including the General Manager Technical Standards to appropriately qualified personnel in a range of engineering disciplines for the following Rail Industry Worker roles:

- **Scoping of Design** – approval of design specifications that can be tendered to industry for the conduct of design.
- **Acceptance of Design** – signing on behalf of ARTC that a design approved by an engineering design firm is acceptable for its intended use by ARTC.

3.4 Commissioning & Testing Requirements

Interim maintenance drawing hard copies shall be provided on completion of commissioning. The required number of copies will be advised by the ARTC point of contact. One copy shall be forwarded to the DMS Administrator.

Where applicable, delivery of the final master copy of the drivers diagram is required at least four weeks prior to commissioning. Delivery of the text for the applicable SAFE Notice / Train Notice is required at least three weeks prior to commissioning.

3.5 Project Completion and Handover Requirements

Where submitted documents, drawings and software have been advised as unacceptable, resubmission of the corrected documents, drawings and software shall be provided within 30 days of the commissioning. All deliverable documentation including all work packages are to be supplied.

3.6 Managing Drawing Updates for Multiple Simultaneous Works

Where particular drawings are required for update by more than one party at the same time, a Design Interface Agreement or Overlapping Design Agreement is to be produced and agreed upon by the relevant parties.

This agreement is designed to clearly detail the roles, responsibilities and process to achieve complete and accurate update of all drawings.

The Design Interface Agreement (DIA) or Overlapping Design Agreement (ODA) shall contain the following types of information:

- Scope
- Timetable
- Responsible persons/roles
- Key milestones
- Transfer of designs between parties
- What happens if project delivery changes
- As Built delivery/transfer
- Transfer of custodianship of drawing masters
- Advice of updates to the DIA / ODA
- Change to scope or design plan

The DIA / ODA shall be signed by a representative of all organisations that are updating drawings and by an ARTC representative.

A Design Interface Agreement template EGP0401F-04 is available on the ARTC website https://extranet.artc.com.au/eng_all_form.html

3.7 Use of Standard Drawings for Projects

ARTC has existing standard drawings for infrastructure items such as turnouts, culverts, bridge and signal components and level crossings. Some of these drawings are ARTC drawings and some are provided by the manufacturer/supplier.

Where these drawings are used as part of a project or maintenance activity, new location specific drawings are not necessarily required to be provided. Details of the standard drawings used, such as drawing number and title, should be captured as part of the project documentation in order to satisfy auditing requirements as part of project management activities.

If existing standard drawings from manufacturers/suppliers require amendment prior to being suitable for a particular project or maintenance activity, then these amended drawings need to be supplied for inclusion in the Drawing Management System along with any location specific drawings generated from these works.

If ARTC standard drawings need to be amended, arrangements need to be made with the Standards Manager regarding these potential changes. Refer to EGP-04-02 Drawing Management System section 6.3 for additional information.

4 General Requirements

4.1 Drawing Format

All drawings are to be produced to Australian Standard AS1100 Technical Drawing or ARTC agreed equivalent.

- Designs shall be produced in accordance with designated ARTC Standards and contract requirements.
- All new designs or amendments shall be produced in CAD format (AutoCAD .dwg preferred or Microstation if agreed by ARTC).
- ARTC drawing sheet templates are to be used. See section 4.1.1 for further details. (Existing NSW & QLD locations may continue to use the NSW signal drawing templates)
- Each CAD file shall contain only one drawing sheet. Two drawings shall not be on the one CAD file layer or on separate layers on the CAD file.
- Each CAD file shall be self-contained with no external links or references which may result in an incomplete file being accessible for future use.
- Where an existing drawing requiring changes is not in CAD format, it shall be put in CAD format for any amendments.
- Amending drawings on hard copy printout is only permitted for As Commissioned drawings with the changes being incorporated into the As Designed CAD file at the time of updating to As-Built.
- The initial issue of all drawings shall be signed by the designer, checker, independent reviewer / verifier, approver and acceptor. Secure digital signatures can be utilised subject to sufficient certification details accompanying the file containing these signatures.
- The name (in the form J. Smith) of the designer, checker, independent reviewer / verifier, approver and ARTC acceptor of the original drawing, is to be included in the drawing sheet of the electronic copy of each drawing in the blocks provided for original signatures on initial issue. The date of each respective action shall also be included.
- Year of Creation on the ARTC drawing template shall be the year the drawing is originally created and will remain the same for the life of the drawing irrespective of future revisions. However on the NSW signal drawing templates only the current revision date is shown.

The CAD cell library for NSW signal drawings is available on the website

http://extranet.artc.com.au/eng_signal_drawing.html The CAD cell library for other signal drawings is available from the DMS Administrators or the Victorian PTV DMS. Further information on CAD Standards can be found in procedure ESD-25-01 CAD & Drafting Manual for Signalling Drawings.

4.1.1 Drawing Templates

A standard drawing template is available in metric 'A' size sheets. Where a drawing won't reasonably fit within a standard metric A size sheet, the template may be expanded as necessary as long as the required metadata is still provided.

These templates are available from the ARTC website http://extranet.artc.com.au/eng_network-config_drawing.html.

NOTE: Existing NSW & QLD locations may continue to use the NSW signal drawing templates.

4.2 Revision of Existing Drawings

4.2.1 General Drawing Updates

When an existing CAD drawing is to be revised, a request to the DMS Administrator must be forwarded requesting a copy of the master file. Refer to procedure *EGP-04-02 ARTC Drawing Management System* for further details.

The DMS Administrator will then supply an electronic copy of the current version to the requestor. In the case of non-CAD drawings, the DMS Administrator will supply an electronic copy in the available format.

Following commissioning, any outstanding or updated drawings must be booked into the DMS within 30 days. If an extension is required, it must be granted via the ARTC DMS by the Authorised Manager.

The ARTC DMS automatically identifies drawings booked-out for revision. Periodic reviews of outstanding drawing requests will be performed by the DMS Administrators.

All revisions are to be described in the next available revision box on the drawing sheet. Initial designs utilise an alphabetical character (beginning with A) with the finalised design being revision 0. All following revisions then use the next available number. The revision is also to be shown in the revision boxes above the drawing number on the drawing sheet. For existing NSW & QLD locations, revision details are to be shown on the amendment & control sheets for signal circuit books and in the amendment table for other signal drawings such as signal plans and track insulation plans. Refer to section 6 for further information.

The name (in the form J. Smith) of the designer, checker, independent reviewer / verifier, approver and ARTC acceptor and the date of the approver's signature shall be shown on the electronic copy in the revision area of the drawing sheet.

Standard engineering drawings require approval from the Standards Manager refer to procedure *EGP-04-02 Drawing Management System* section 6.3 for more information.

4.2.2 Marked-Up Maintenance Copies Held Onsite

When minor changes in the field are implemented due to maintenance, the interim maintenance copies of drawings held at onsite locations (e.g. signalling huts) are marked-up with the change. The As-Built master drawings held in the DMS should then be updated to reflect the changes as per the marked-up maintenance copy.

After the As-Built master drawings have been updated in the DMS to reflect the changes in the field, a copy of the new As-Built drawings will be issued to the field to replace the interim maintenance copies held onsite.

Where the need for alterations to existing drawings are identified by personnel in the field, the following steps are to be taken:

1. The potential changes are to be documented either via a marked-up maintenance copy of the drawing, or via a written change document explaining the required change (*EGP0401F-01 Drawing Alteration Request Form* may be used for this purpose). The personnel requesting the change should write their name, date and sign the marked-up drawing or change request document.

2. The above change request is forwarded from the field personnel to the appropriate corridor discipline engineer.
3. The corridor discipline engineer will review the proposed changes with the latest master As-Built drawing held in the DMS and determine whether changes are required to the master As-Built copy. The corridor discipline engineer will either authorise the change, or not.

Authorise the Change	Not Authorise the Change
<ol style="list-style-type: none"> 4. Corridor discipline engineer <i>Authorises</i> the change request drawing/document by inserting their name, position, date and signing the form. 5. Corridor discipline engineer requests to book out the relevant master As-Built drawings from the DMS administrator. (Note : The preference is to update the As-Built drawings immediately, however if there will be a delay in updating them, then in the interim a scanned and signed copy of the change request drawing/document should be sent to the DMS Administrator and stored in the ARTC DMS until such time as the As-Built is updated.) 6. The corridor discipline engineer will arrange for the appropriate updates to be edited to the master As-Built drawing. 7. The corridor discipline engineer will review the edits and ensure the checking / verification / approval / acceptance process is followed for the drawings. Refer to the Rail Safety Worker Competency Matrices available on the Safety Management section of the ARTC website for competencies required for drawings. 8. The corridor discipline engineer will return the new accepted As-Built drawing back to the DMS Administrator. 9. The DMS Administrator will book-in the new As-Built back into the DMS to become the new master. <i>NOTE: Any altered As-Built drawings for infrastructure in the State of Victoria must be updated in the PTV DMS.</i> 10. The corridor discipline engineer will ensure the field personnel will arrange to update the field maintenance copy with the new As-Built copy. 	<ol style="list-style-type: none"> 4. Corridor discipline engineer does <i>Not Authorise</i> the change and records the reason for not approving the change on the request drawing/document. 5. Advises the personnel who forwarded the request that the change was not authorised.

NOTE: The field copy should always be maintained to show the infrastructure in its current state.

4.2.3 Correlation / Dilapidation Survey of In-Service Infrastructure

The latest As-Built drawings in the DMS, or the marked-up maintenance copies of drawings held onsite may not possibly exactly match the actual in-service field infrastructure due to a multitude of reasons – e.g. poor record keeping during maintenance, project teams not updating the DMS post commissioning, etc.

This is a potential risk for maintenance, design / delivery of projects, and operations. Where this is identified, a correlation should be undertaken and the master As-Built drawings updated.

A *correlation* is the process of verifying the contents of a drawing against the actual in-service field infrastructure. Correlation is the general term used in signalling, however the term *dilapidation survey* may possibly be used for track and civil. A correlation / dilapidation survey may be performed prior to a design / project being undertaken.

When a correlation / dilapidation survey is deemed required it should address the following:

1. A correlation / dilapidation survey should be undertaken to cover all the relevant sections of infrastructure in the network as per the project scope / design requirements.
2. The correlation / dilapidation survey limits shall be sufficient to ensure the design is safe so far as reasonably practical.
3. It should be performed prior to design work being undertaken and any drawings accepted as Issued for Construction. Any deficiencies should be investigated and recorded.
4. Correlation / dilapidation surveys should be carried out by persons having a current competence in their role as per the ARTC competency matrix.
5. Any altered As-Built drawings for infrastructure in the State of Victorian must be updated in the PTV DMS.

The following is an example correlation process that may be undertaken for a signalling design project:

1. Designer requests copies of all the As-Built drawings from the relevant DMS Administrator (ie. ARTC DMS, or PTV DMS).
2. Designer compares the As-Built drawings with the field maintenance copies and notes any differences. NOTE: If the field copies are older versions to the DMS versions, then a correlation check is required to be performed with the newest version (i.e. the DMS version).
3. Designer performs a correlation check (as per requirements in *ESC-21-03 Inspection and Testing of Signalling – Inspection and Testing Principles*, *ESI-05-14 Signal Design and Maintenance of Configuration Information*) and compares the latest version drawing with the actual in-service infrastructure and drafts a red-line mark-up copy of any differences.
4. Designer forwards the red-line mark-up copy to corridor ARTC Signal Maintenance Engineer.
5. ARTC Signal Maintenance Engineer reviews and approves the updated red-line mark-up copy.
6. ARTC Signal Maintenance Engineer scans the updated red-line mark-up copy and provides the scan to the ARTC DMS Administrator for uploading into ARTC DMS (Note: For Victorian infrastructure, the redline mark-up copy would not be stored in the PTV DMS, only in the ARTC DMS).

7. Designer requests and books-out the As-Built master drawing from the DMS Administrator (ARTC DMS, or PTV DMS) The designer updates the CAD drawing to incorporate the red-line mark-up changes.
8. Designer forwards the updated As-Built master CAD file to the ARTC Signal Maintenance Engineer. ARTC Signal Maintenance Engineer ensures the checking, verification and approval process is followed and accepts the drawings.
9. ARTC Signal Maintenance Engineer forwards the new accepted As Built master CAD file to the relevant DMS Administrator (ARTC DMS, or PTV DMS) and the drawing is updated and booked-in to the DMS.
10. ARTC Signal Maintenance Engineer arranges to update the field maintenance copy drawing in the signal hut with the new As-Built drawing.

Designer / projects now continue using the newly updated and correlated As-Built drawing.

4.3 Checking of Drawings

The organisation producing the new or revised drawings is responsible for the accuracy and correctness of all new or revised drawings provided to ARTC.

Drawings completed by the designer are to be checked by another applicable discipline qualified person for compliance to technical drawing requirements and ARTC general drawing requirements.

4.4 Independent Review / Verification of Drawings

An independent reviewer / verifier will check the drawings for compliance to ARTC project requirements and standard design practices and principles.

The independent reviewer / verifier may be from the same organisation as the designer or from another organisation. Where the designer and independent reviewer / verifier are from the same organisation, the reviewer / verifier must work sufficiently separate from the designer to assure that no conflict of interest can occur.

Minor corrections to drawings e.g. typographical errors, may not require Independent Third Party checking. Any minor corrections not subject to Independent Third Party checks shall be accompanied by a statement signed personally by the applicable ARTC discipline engineer. The statement is to be included on the pdf copy of the drawing.

This statement shall be as follows:

"I certify that the changes made to this drawing are of a minor nature only and do not affect the integrity of the design and Independent Third Party checking is not required."

4.5 Approval of Drawings

The organisation which produces the new or revised drawings is responsible for approving the drawings. The approver accepts responsibility for ensuring that the drawings have been appropriately reviewed and the content accurately reflects the design calculations.

For larger projects which require drawings for multiple disciplines, the approver for each discipline must check with other approvers to ensure all project requirements are being met and that no conflicts to other designs are identified.

4.6 ARTC Acceptance of Drawings

All drawings shall be accepted on behalf of ARTC by the applicable discipline competent project or maintenance engineer. The drawings shall be accepted as complying with the engineering requirements of the project.

Acceptance is provided by signing a printed copy of each drawing and scanning the signed copies into a single file. Where large sets of drawings are involved, acceptance of the complete set can be made by signing the index/cover sheet (and the control sheet for signal circuit books) and printing the acceptors name in the ARTC Acceptance blocks in both the name and signature sections on each drawing in the set.

The accepted drawings are to be supplied to the relevant DMS Administrator with the original master files and completed metadata sheet for inclusion in the DMS.

4.7 Timeframes

The design contractor shall provide drawings to ARTC to be registered in the DMS at each stage of a project as follows:

Drawing Type	Submit to DMS Administrator
As Designed / For Construction	Within 10 working days following issue for construction
As Commissioned	Interim maintenance copies at the time of commissioning into service Electronic files within 10 working days of commissioning into service
As Built	Within 30 working days of commissioning into service

Any deviation from these timeframes must be agreed with the relevant corridor Asset Manager with sufficient controls in place to ensure that all necessary changes (especially where multiple works are involved) are captured and the updated records are provided within the agreed amended timeframe.

4.8 Cancelled or Deferred Projects

When a project is cancelled or deferred and drawings have already been issued for update, the DMS Administrator shall be advised within 10 working days so that details within the Drawing Management System can be updated and drawings released for future updates as required.

If final design has been achieved, the documents can be registered in the DMS.

If the project was cancelled or deferred in an earlier design phase, the unused design drawings are to be archived in the project file.

Refer to procedure EGP-04-02 Drawing Management System for details on how to update the system for this occurrence.

4.9 Third Party Project Drawings

All third party projects undertaken on ARTC infrastructure shall produce drawings in accordance with ARTC requirements. Other drawings relating to the same project which are past the defined ARTC interface may be supplied in the third party's format.

Third party projects in the ARTC rail corridor undertaken in accordance with procedure ETG-17-01 Installation of Utility Services and Pipelines within Railway Boundaries shall provide Issued for Construction drawings in the third party's format.

Drawings provided in the third party's format will be for reference purposes only and their status will need to be confirmed with the issuer if required for future works.

5 Electrical Drawings

5.1 Location Drawing

Location drawings are to be supplied on completion of work to the DMS Administrator for inclusion in the DMS.

Location drawings are to incorporate the following:

- Location of UG cables measured from fixed reference points i.e. Rail lines, buildings
- Depth, size, number and type of cables
- Enclosure type
- Voltage of enclosed cables
- Marking tape type and depth
- GPS points at entry & exit points plus every 50 metres
- Date installed
- Other cables and services found on installation

6 NSW Signalling Specific Requirements

For signal projects the drawings for a location or interlocking shall be configured into a circuit book. The Circuit Book Control Sheets and Amendment Sheets shall be updated to reflect the new work. The design date for all new or amended drawings shall be the date of the Design Check. Any changes during independent checking, construction, testing or commissioning shall be the date of the design check of these changes.

A complete history of all signal jobs including the reference number and title and all affected circuit book sheets relating to each job is to be maintained in the circuit book file. Additional amendment and control sheets can be added as required and each one noted in the relevant field as being part of a set of these sheets.

The date field on the circuit book amendment sheet relates to the date that the infrastructure was changed in the field and not the date the drawings were amended.

Further information may be found in signalling standards SCP 06 Signalling Documentation and Drawings and ESD-25-01 CAD and Drafting Manual for Signalling Drawings.

Note: *The Circuit Book control sheet shall list all drawings that form the circuit book and not just the new or amended drawings.*

6.1 Signal Drawings

Signal drawings are to be supplied on completion of work to the DMS Administrator for inclusion in the DMS. Typical signal drawing types and their content are described as follows:

6.1.1 Circuit Book

- Automatic signals
- Section controls
- Level crossings
- Panel controls
- Interlocking and signal controls
- Points
- Miscellaneous vital
- Diagram
- Power
- Indicators and alarms
- Communications
- Analysis

6.1.2 Drivers Diagram

- Track layout – not to scale
- Level Crossings – names, km
- Permanent signage and km

Release switches and ground frame locations

Signal km and indications

Point km

Line description (main, loop, siding)

6.1.3 Signal Plan

Track layout

Glued Insulated Joint (GIJ) location

Cable plan

Mechanical Interlocking

Axle Counter Heads

Mains power supply information

Level crossing approach information

Kms for signals, points, level crossings, permanent signs

Track circuit information

Curve and gradient details

6.1.4 Track Insulation Plan

Signals

Signal rail

Glued Insulated Joint (GIJ) location

Axle Counter Heads

Track circuit name, polarity, type, bonding

6.1.5 Detail Site Survey (to scale)

Kilometre and half kilometre posts

Cable routes

Underline crossings

Station buildings

Signal boxes

Relay rooms, housings and location cases

Line-side equipment

Existing buildings

Overhead wiring structures

For more detailed information relating to Signal drawing requirements refer to:

ESD-25-01 CAD & Drafting Manual for Signalling Drawings

6.2 NSW Signal Drawings Master Files Naming Convention

Document Name	Document Number (xxx = circuit book number)
Circuit Book	Refer instructions in ESD-25-01
Signal Plan	Dxxx0011
Track Insulation Plan	Exxx0011
Drivers Diagram	DDxxx001

6.3 NSW Signal Drawings Scanned Copies Naming Convention

Document Name	Document Number (xxx = circuit book number)
Circuit Book	CBxxx
Control Tables	CTxxx
Drivers Diagram	DDxxx
Detailed Site Survey	DSSxxx
Signal Plan	SPxxx
Track Insulation Plan	TIPxxx
Aspect Sequence Chart	ASCxxx
Focussing Diagram (linked with SP)	FOCxxx

6.4 Signalling Design Data

Signalling Design Data includes but is not limited to the following:

- Microlok Data and configuration table
- Other Computer Based Interlocking Data and configuration table
- Grade Crossing Predictor data
- VDU signal control systems data and screen designs
- Telemetry remote control systems data and design
- Any configuration or other data in data communications links for CBI or telemetry systems
- Level Crossing Monitor data and configuration
- Fortress Lever locks data register
- Power Supply Design calculations
- Control Tables

For details regarding the requirements for management of Signalling Design Data refer to the signal standards on ARTC's website. https://extranet.artc.com.au/eng_signal_procedure.html

6.5 Signalling Testing Files

Microlok Interlocking Simulation System or MISS files are created during the testing period when Microlok data is being updated and prior to installation of the updated data version.

MISS files are to be supplied to ARTC as part of the signalling As Built package provided at the completion of the project.

7 Project Drawings Flowchart

