Division / Business Unit: Safety & Systems
Function: All Disciplines
Document Type: Procedure

Engineering Drawings and Documentation

EGP-04-01

Applicability

ARTC Network Wide

SMS

Publication Requirement

Internal / External

Primary Source

Document Status

Version #	Date Reviewed	Prepared by	Reviewed by	Endorsed	Approved
4.3	15 Feb 24	Operational Readiness Specialist	Stakeholders	Configuration Manager	Head of Operations Standards 22.04.2024

Amendment Record

Amendment Version #	Date Reviewed	Clause	Description of Amendment
4.0	17 Jan 22	Various	Significant re-write of procedure.
4.1	22 Apr 22	2.3	Drawing Number inclusion in template clarified.
4.2	23 Jun 22	2.1, 2.8, 3.2, 5.1, 5.4, 5.6	Clarified use of PTV drawing template for IFC and As-Commissioned drawings. Included ability for secure digital signature into acceptance of large drawing sets. Added geocentric datum requirements for survey & GIS drawings.
4.3	15 Feb 24	1.5	Update applicable documents.

	2.4, 4.2, Appendix C	Provide further detail on 3D model requirements. Note added for revised designs and NSW signal requirements updated.

Table of Contents

1 Introduction

1.1 Purpose

This document sets out ARTC's standards, practices, and procedures for the preparation, approval, storage 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, constructed and commissioned. They form part of the permanent record-keeping governance requirements as required by law under the lease agreements undertaken by ARTC.

Whilst projects utilise them in the planning, design, and construction of new or altered infrastructure, they're also used for maintenance purposes for ongoing asset management.

They're critical for reconstructions / repairs in the event of an accident, structural failure, or natural event which may cause damage to ARTC's track, civil, structural and signalling infrastructure.

The engineering drawings and documentation relating to ARTC's infrastructure are stored in ARTC's Drawing Management System (DMS). Reference copies of drawings for other third-party infrastructure contained within the rail corridor may also be stored in the ARTC DMS.

For more detailed information on using the ARTC DMS, refer to the procedure *EGP-04-02 ARTC Drawing Management System.*

The different phases that projects pass through, as per *EGP-20-01 Project Management Framework*, will require drawings to proceed through different stages and be stored in the ARTC DMS:

- Design Iterations
- Issued-for-Construction (IFC) / As-Designed
- As-Commissioned / As-Constructed
- As-Built / Works-As-Executed

1.4 Definitions

The following terms and acronyms are used within this document:

Term or acronym	Description
Bound CAD Drawing	Native format CAD drawing sheet in which all loaded CAD drawing references are inserted directly and the CAD drawing sheet no longer relies on CAD drawing reference (Xref) files for completeness.
CAD	Computer Aided Design
CAD Drawing Reference	Native format CAD drawing files containing surveying products or design objects which are loaded into native CAD drawing sheets (commonly known as Xrefs).
CAD Drawing Sheet	Native format CAD drawing file into which CAD drawing reference (Xrefs) files are loaded and are the direct source of published (PDF) CAD drawings.
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.
Drawing Management System (DMS)	A software package that stores and maintains access to drawings and documentation
Digital Signature	A digital signature utilises technology that associates the signature with hidden data which can be used in an electronic communication (e.g. private or public key cryptography). Common types of applications used to generate and manage digital signatures include Adobe Sign and DocuSign.
Electronic Signature	An electronic signature is one that is applied to an electronic document. A common type of electronic signature are wet hand-signed signatures on paper which is then scanned and electronically “cut and paste” into a document as an image. *Electronic signatures are not permitted in the signing of ARTC drawings*.
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.
PTV Drawing Certifier	This person certifies that the drawing is an accurate representation of actual as-in-service conditions when uploading drawings into the PTV drawing management system. This person is not certifying the design, only that it’s an “accurate representation”.

Term or acronym	Description
Repository	A repository is simply the different sub-locations where drawings may be stored within the Drawing Management System – it may also be thought of as a sub-directory / folder / project.
Unbound CAD Drawing	Native format CAD drawing sheet in which loaded CAD drawing references may rely on externally linked CAD drawing reference files (Xref) for completing the information on the drawing.
Unbound CAD Drawing Package	An archive file containing multiple one or more unbound CAD drawings and their accompanying CAD drawing reference files (Xref).
Wet Signature	A wet signature is when you physically hand sign a piece of paper.
Xref	The common term for a CAD drawing reference file which are loaded into native CAD drawing sheets. They are used on unbound CAD files.
Portable Document Format (PDF)	Standardized as ISO 32000, it's a file format developed by Adobe in 1992 to present documents, including text formatting and images, in a manner independent of application software, hardware, and operating systems.

1.5 Applicable Documents

This standard shall be read in conjunction with the following publications:

- AS1100 Technical Drawing - The Australian Standard for technical drawings, including engineering survey design drawing and structural engineering drawings and contains attributes that are universal around Australia.
- AS13567 Technical Product Documentation Organisation and Naming of Layers for CAD
- EGP-01-03 Engineering, Design and Project Management Identification of Competence
- EGP0103F-01 Engineering Design & Project Management Matrix
- EGP-02-01 Engineering Waiver Management
- EGP-03-01 Rail Network Configuration Management
- EGP-04-02 ARTC Drawing Management System
- 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-20-01 Project Management
- ESC-21-03 Inspection and Testing of Signalling – Inspection and Testing Principles
- CAD and Drafting Manual for Signalling Drawings
- ESI-05-14 Signal Design and Maintenance of Configuration Information
- PP-153 Third Party Access to ARTC Property
- ESD-25-03 Signalling Documentation and Drawings
- EGG-20-01 Project Management Data Deliverable Descriptions
- ETA-00-03 New Track Construction

2 Drawing Requirements

2.1 General Requirements

- All new designs or amendments must be produced in CAD format (AutoCAD .dwg preferred, or Microstation if agreed by ARTC).
- All drawings are to be produced to Australian Standard AS1100 Technical Drawing, or ARTC agreed equivalent.
- For all assets in the State of Victoria, As-Built drawings must use the PTV drawing templates and comply with the PTV infrastructure drafting standards. IFC and As-Commissioned drawings for the State of Victoria assets may also use the PTV drawing templates and be stored in the ARTC DMS.
- Designs must be produced in accordance with designated ARTC Standards and contract requirements.
- Any deviation from ARTC Standards and are to be approved by Technical Standards and the drawings must include notes with the waiver number that authorised the deviation. Refer to procedure EGP-02-01 Engineering Waiver Management for more information on the applying and approvals process for waivers.
- Where an existing drawing is not in CAD format and requires alteration, it shall be transferred into CAD format for any amendments.
- Existing drawings already in CAD format, but not using the latest ARTC template / CAD Specification, may continue to use the existing CAD format and is not required to be updated to the latest ARTC template / CAD Specification.

- Amending drawings on hard copy printouts may only be performed for As-Commissioned drawings, with the changes being incorporated into the Issued-For-Construction drawings at the time of updating to As-Built drawings.
- The “Year of Creation” on the ARTC drawing must be the year the drawing is originally created and will remain the same for the life of the drawing irrespective of future revisions.
  Note: For the NSW / QLD signal drawing template, only the current revision date is shown.

2.2 CAD Drawing Templates

- All new designs or amendments must be produced in CAD format (AutoCAD .dwg preferred, or Microstation if agreed by ARTC).
- For new designs / drawings, ARTC CAD drawing sheet templates are to be used.
- The CAD drawing sheet templates are available in metric size sheets: A0 to A4
- The CAD drawing sheet templates are available from the ARTC website, as per the link below:
  http://extranet.artc.com.au/eng_network-config_drawing.html
- Where a drawing won’t reasonably fit within a standard metric ‘A’ sized sheet, the template may be expanded as necessary provided the required metadata is still included and legible.
- Older existing drawings may not have used the current CAD template. If these drawings require modification, then they may continue to use their existing CAD format.

Signal Drawings

- Existing NSW / QLD location drawings may continue to use the NSW signal drawing templates. Refer Appendix C for further information.
- Additional CAD requirements for signalling may be found in procedure ESD-25-01 CAD & Drafting Manual for Signalling Drawings.
- CAD cell libraries:
  - NSW / QLD signal drawings - available at the website link below
    http://extranet.artc.com.au/eng_signal_drawing.html
  - Other signal drawings – available from the ARTC DMS Administrators, or the Victorian PTV DMS Administrator.

Public Transport Victoria (PTV) Templates

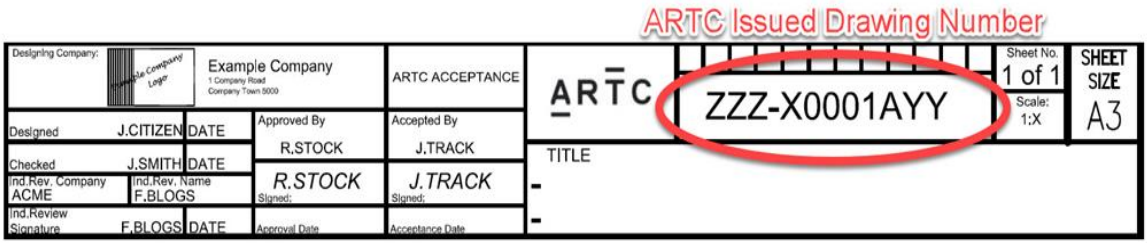
- For all assets in the State of Victoria, As-Built drawings are required to be stored in the PTV drawing management system and must use the PTV drawing templates and comply with the PTV infrastructure drafting standards.
- For more information, refer to Section 3.2 Public Transport Victoria (PTV) Drawing Management System.

2.3 Drawing Numbers Location on Template

ARTC Issued Drawing Numbers

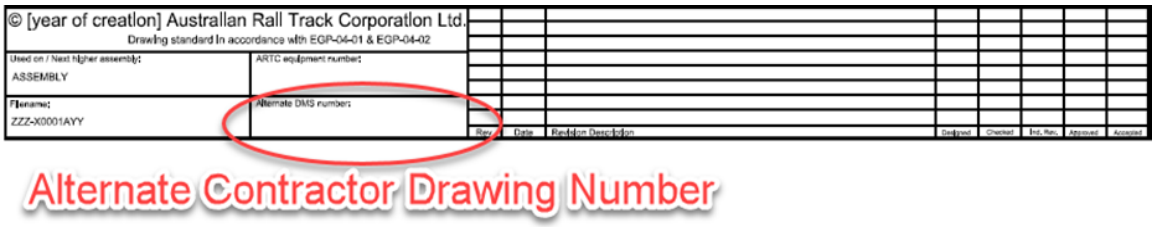
ARTC issued drawing numbers must be used and shown in the drawing template when the drawings have completed the final design stage and are ready to be issued- for-construction and subsequently uploaded into the ARTC Drawing Management System. All subsequent drawings (e.g; as-commissioned, as-built) are to also have the ARTC issued drawings numbers in this location.

The ARTC issued drawing number must be included in the box provided on the right hand side of the ARTC logo and above the drawing title, as per the image below.

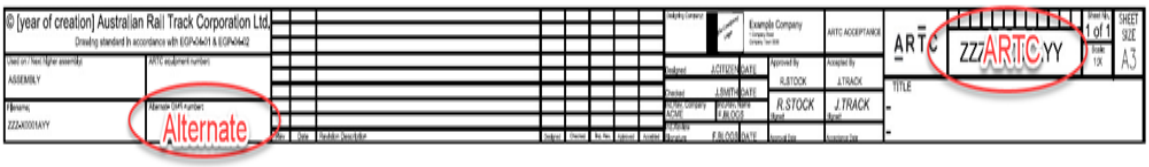


Alternate Contractor Drawing Numbers

Alternate contractor drawing numbers may be utilised by the contractor and are to be referenced in the drawing template box "*Alternate DMS Number*" on the left hand side of the template, as per the image below. They are not to be placed in the ARTC issued drawing number box on the template for any issued-for-construction or subsequent drawings. The contractors drawing numbers may also then be captured in the drawings metadata loaded into the ARTC drawing management system for future reference.



The final drawing number layout will be as per the image below.



2.4 3D Models

- Large projects within ARTC (e.g. Inland Rail, Major Construction Projects) may utilise 3D models (e.g. Building Information Modelling, BIM) for the design and CAD drawing creation.
- ARTC maintains and stores 3D models for track design and alignment. These must be transferred to the ARTC DMS Business Unit at IFC and As Built stages of a project.
- It's not mandatory to store other 3D models in the ARTC DMS Business Unit repositories due to the significant storage size required for these files. It's the CAD drawings that will be used for future asset management and maintenance by the Business Units, rather than the 3D models.
- The other 3D models may however be stored in the ARTC DMS Project repositories for reference purposes during the project and then archived at the completion of the project.

2.4.1 Track Design and Alignment Models

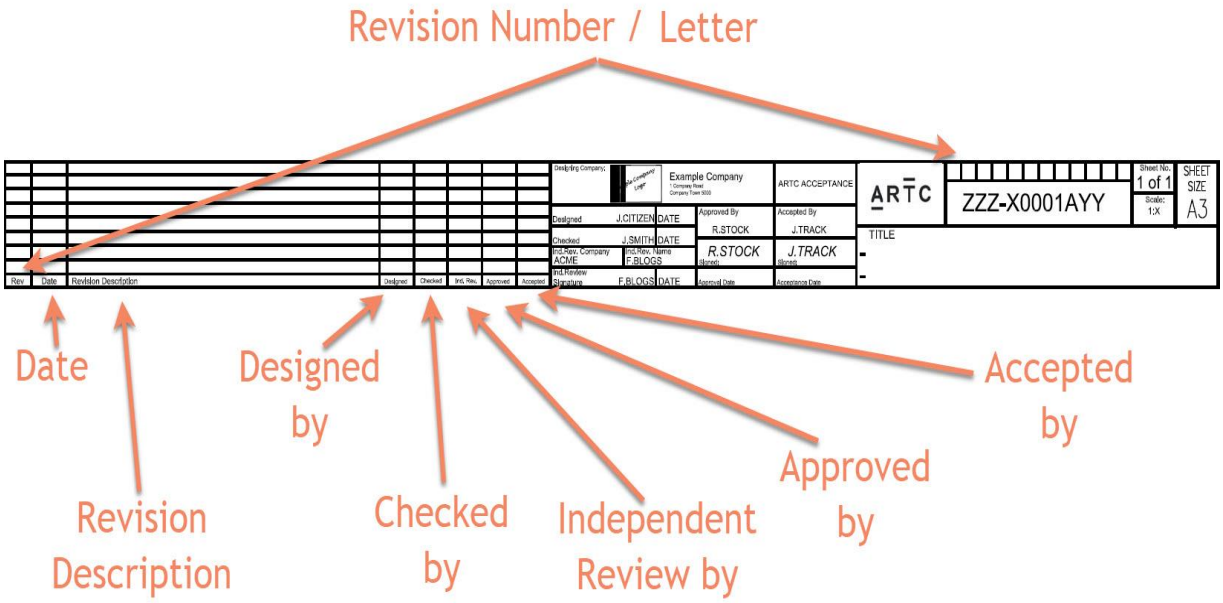
- ARTC requirements for Track Design and Alignment Models are detailed in ETA-00-03 New Track Construction
- Alignment Drawing deliverables shall be derived directly from the 3D models and data supplied with necessary 2D information in all stages of the project as well as in the As-Built documentation.

2.5 Version Control

- Version control is required for all drawings to ensure they have a trusted version history to support users in confirming currency of information and relationships to supporting data.
- Version control for all drawings is achieved via a "revision code" on each drawing.
    - Design Drawings - Initial designs shall utilise an alphabet character (beginning with A, and through to Z) as the revision code. Each design iteration will use the next subsequent character in the alphabet as the next revision code.
    - Issued-For-Construction & As-Built Drawings - Once the designs are finalised and ARTC has accepted them as Issued-For-Construction, the IFC stamped drawings will begin at revision 0 (zero). All following revisions will then use the next sequential number (ie 0, 1, 2, 3…). As the drawings move into As-Builts, the next revision number in the sequence will be allocated and the drawing stamped "As-Built".
        - *Note:* 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 *APPENDIX C – NSW / QLD Signalling* Specific Requirements for further information.
- The revision information must be clearly shown on the drawing in the next available revision box cell on the drawing sheet. See the Figure below.

  - Revision code number / letter – the revision code will be placed in two locations on the drawing. One in the revision box, the other above the drawing number in the title block.
  - Date of revision
  - Description of the changes involved
  - Name initials (e.g. JS for John Smith) of the designer, checker, independent reviewer / verifier, approver and ARTC accepter (where applicable for the revision update).
- 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.

Figure – Revision Details



2.6 Standard Drawings

ARTC has “standard” drawings for commonly used infrastructure items such as turnouts, culverts, level crossings, bridges, signal components, etc. Standard drawings may be used over and over for different projects / maintenance as they’re the same item being used repeatedly within the network.

There are two types of standard drawings:

- ARTC Owned Standard Drawings – These are drawings for items that ARTC have drafted themselves, or perhaps contracted out to manufacturers / suppliers to create a bespoke item for ARTC and drafted using ARTC drawing templates.
- Manufacturer / Supplier Standard Drawings – These are drawings that have been drafted and provided by a manufacturer / supplier for equipment they supply. The drawings are “owned” by the manufacturer / supplier.

Drawing Numbers

- *ARTC Owned Standard Drawings* – New drawing numbers for new ARTC owned standard drawings must be requested and supplied by the ARTC corridor DMS Administrator to ensure there’s no duplication of standard drawing numbers.
- *Manufacturer / Supplier Standard Drawings* – The manufacturer / supplier will generate their own drawing numbers and these numbers will be used when uploading into the ARTC DMS.

Using Standard Drawings

- Where standard drawings (either ARTC owned, or manufacturer / supplier owned) 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 included in the main drawing index sheet, or as part of the project documentation in order to satisfy auditing requirements as part of project management activities. These details may also be entered into the Asset Management System for that particular asset, if applicable.

. **Alterations to Existing Standard Drawings**

- *ARTC Owned Standard Drawings* – Existing ARTC owned standard drawings that require updating will require the completion of a *Drawing Alteration Request Form (EGP0401F-01)* specifying the changes required and reason for the change. This form is to be submitted to the corridor DMS Administrator. The corridor DMS Administrator will liaise with the *Manager Technical Standards* for their approval to proceed. The drawings will not be issued for update until the form has been approved by the *Manager Technical Standards.*
- *Manufacturer / Supplier Standard Drawings* – The manufacturer / supplier will be required to be contacted for any updates to their drawings. Depending upon the change:
    - the standard drawing may be updated in the ARTC DMS if applicable to all equipment in the field, or
    - a separate standard drawing created for this next version of equipment with a new drawing number, or
    - if location specific only, then it may be included in the project drawings in the ARTC DMS for that location and not as a standard drawing.

2.7 Third Party Drawings

The interface between ARTC and a third-party asset owner will generally be defined by an agreement (i.e. Contract) between ARTC and the third-party asset owner. This agreement will define the limits and may include any potential overlap of CAD drawing documentation required for new and modified assets for both ARTC and the third-party.

Potential third party asset owners which may be affected could be the Federal Government, State Governments, Local Government Authorities, other Rail Infrastructure Managers (RIMs), and private owners of track, road or utility infrastructure. *Note : In this context, this does not mean sub-contractors for performing works, it's an asset owner*.

This procedure does not define this interface and is to be addressed by the Project Manager on an individual case-by-case basis. The ARTC cadastral limits should be shown on the drawings.

ARTC Works Impacting Third Party Assets

Works performed by ARTC predominantly impact changes to third-party assets at road interfaces, track interfaces, and utility asset owners. This procedure does not cover CAD requirements for infrastructure outside the general ARTC track corridor.

The Contractor (or ARTC) shall produce CAD deliverables to fulfill the requirements of the third-party. A combination of ARTC and third-party CAD standards may be required to achieve an agreed project CAD standard. This combined standard is to be agreed between the ARTC project manager and the third party.

These drawings are to be stored in the ARTC Business Unit repository.

Third Party Works Impacting ARTC Assets

Works undertaken by third-party asset owners (or their contractors) within ARTC land, as per procedure *PP-153 Third Party Access to ARTC Property*, should:

- Produce drawings for infrastructure within ARTC land in accordance preferably with the ARTC CAD requirements, however other formats may be accepted for minor works.
- Provide other related drawings for infrastructure outside the defined ARTC interface (ie outside ARTC land) in accordance with either the ARTC CAD requirements or the third-party's format.
- Be compliant with procedure *ETG-17-01 Installation of Utility Services and Pipelines within Railway Boundaries,* if applicable, and provide Issued-For-Construction drawings.

Drawings provided in the third party asset owners format will be stored in the ARTC DMS Business Unit repository for reference information purposes only and their current status will need to be confirmed with the third-party asset owner if required for future design / maintenance works.

2.8 Geocentric Datum

For drawings which provide positional precision and accuracy, such as survey or GIS based drawings, it's important they include the geocentric datum that's being used and referenced in the drawing.

The Geocentric Datum of Australia 2020 (GDA2020) shifted by 1.8 metres from the previous Geocentric Datum of Australia 1994 (GDA94). Hence to maintain an understanding well into the future of the horizontal and vertical positional location of assets today, it's important that the datum used be included on the drawing.

A box at the top left hand corner of the CAD drawing template has been included for recording this information.

3 Drawing Management Systems

3.1 ARTC Drawing Management System

ARTC has a legislative requirement to store up-to-date drawings for all assets being maintained and managed within the ARTC network. The ARTC Drawing Management System (DMS) holds the drawings related to this ARTC infrastructure (e.g. signalling, track, civil, structures, etc).

The ARTC DMS also contains reference copies of drawings for other infrastructure contained within the rail corridor where applicable (e.g. underbores, third party infrastructure, etc).

Drawings at each of the different stages of infrastructure design, construction and maintenance process are to be stored within the ARTC DMS Business Unit repository:

- Issued-For-Construction / As-Designed
- As-Commissioned / As-Constructed
- As-Built / Works-As-Executed

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

For more detailed information on using the ARTC DMS for accessing and storing drawings / documentation / data, refer to *EGP-04-02 ARTC Drawing Management System*.

The ARTC DMS has two different types of locations within the ARTC DMS where drawings are stored:

- Business Unit Repositories
- Project Repositories

Note: A repository is simply the different sub-locations where drawings may be stored within the Drawing Management System – it may also be thought of as a sub-directory / folder / project.

3.1.1 Business Unit Repositories

Drawings are generally separated and stored based in the ARTC Business Unit where the assets reside. The ARTC DMS has two Business Unit Repositories, plus a general Standard Drawing repository:

- **ARTC IN** – This is the repository for the *Interstate Business Unit* drawings.
- **ARTC HV** – This is the repository for the *Hunter Valley Business Unit* drawings.
- **ARTC STD** - This is the repository for *Standard* drawings that may be used repeatedly for common assets used across the whole of ARTC. Refer to *Section 2.6 Standard Drawings* for more information.

3.1.2 Project Repositories

Large complex projects (e.g. Inland Rail, Major Construction Projects) may decide to setup their own ARTC “Project” repositories setup in the ARTC DMS and resource their own DMS Administrator / Document Controller for the project. The project will fund the additional User Access Licences required.

Their project drawings and documents may be stored in this ARTC DMS Project repository for the duration of the project to assist in working with designers, managing tender documentation, contractors, etc.

At the completion of the project, or at certain key milestones, the drawings are then to be transmitted across to the relevant ARTC Business Unit repository and the ARTC DMS Project repository archived.

3.2 Public Transport Victoria (PTV) 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 for Victoria and must be adhered to.

PTV only accept As-Built drawings into the PTV DMS and the drawings must use the PTV drawing templates and adhere to the PTV CAD specification and approvals process.

To ensure there's only "one single source of truth" for all Victorian assets, *the ARTC DMS does not store As-Builts for Victorian assets – they must be sourced from PTV.*

Since PTV do not store IFC and As-Commissioned drawings, these drawings may be stored in the ARTC DMS. IFC and As-Commissioned drawings for the State of Victoria assets may also use the PTV drawing templates for storing in the ARTC DMS.

For more details on the drawing format requirements of PTV, together with information on the PTV DMS, refer to *APPENDIX A – Public Transport Victoria (PTV) – DMS Requirements*

4 Drawing Stages

As projects progress though the Project Management Phases, as per *EGP-20-01 Project Management Framewor*k, the status of drawings will also progress through design, construct and commission. Note : Some contractors and third party asset owners may have different a naming convention for theses stages, however the intent should be similar.

4.1 Design Iterations

Iterative design reviews may be undertaken on drawings at different levels of confidence / completion (e.g. 50%, 75%, etc) within the design process prior to Issued-For-Construction drawings being accepted.

- *Iterative design drawings are not stored in the ARTC DMS Business Unit Repositories*.
- For major projects, they may have their own ARTC DMS Project repository configured within the ARTC DMS (e.g. Inland Rail, Major Construction Projects Division) where they may store these iterative design drawings.

- At the completion of the project, when drawings are transmitted from the ARTC DMS Project repository to the ARTC Business Unit repositories, these iterative design drawings will not be transferred. They may be archived in the Project repository.
- There may be a situation where a project progresses through this iterative design process and then the project put on hold or cancelled. In this situation the drawings may possibly be stored in the ARTC DMS Business Unit repository as “Information Only” drawings so that the work completed is not lost in the event the project is resumed at a later date.

4.2 Issued-for-Construction (IFC) / As-Designed

Once the iterative design work is 100% complete, the drawings must proceed through the checking, independent verification, approval, and ARTC acceptance process prior to being able to be stamped as Issued-For-Construction (IFC) / As-Designed.

- ***Construction is not to begin until the drawings have been accepted by ARTC as IFC.***
- *If it’s deemed enabling site works may be required prior to IFC drawings being accepted in full, then an Engineering Waiver must be applied for from Technical Standards, as per procedure EGP-02-01 Engineering Waiver Management, and approval granted by the General Manager Technical Standards.*
- The following checking and approvals process will be required to be completed in full with completed signatures prior to any drawings being stamped as Issued-For-Construction. Refer to *Section 5 Drawing Approvals and Acceptance* for a full description of the process requirements for :
    1. Checking of Drawings
    2. Independent Review / Verification of Drawings
    3. Approval of Drawings
    4. ARTC Acceptance of Drawings
- See *Section 5.2 Signatures* for more information on signature requirements.
- See *Section 6.2 Timeframes for Delivering Drawings* for timeframes required for uploading IFC drawings into the ARTC DMS Business Unit repository.
- If IFC drawings are to be modified after initial ARTC acceptance, then version control is required as per *Section 2.5 Version Control* and the checking / review / approval / acceptance process be undertaken once again.

NOTE: If a design is revised after the IFC set has been accepted and issued, then the full revised set is to be provided for acceptance and reissue. Partial revised designs will not be accepted for reissue.

DELIVERABLES:

1. **Bound** CAD format IFC stamped drawing files to be stored in the ARTC DMS Business Unit repository.
2. A scanned pdf copy of each drawing with the approval and acceptance wet signatures on each drawing (or a digital signature with evidence of the executed signing) to be stored in the ARTC DMS Business Unit repository.

4.3 As-Commissioned / As-Constructed

Once construction is complete, the works must be inspected, tested and commissioned ready for operational use.

During the commissioning phase, a copy of the IFC drawings may be “red-pen marked-up” to highlight any differences / changes that may have occurred during construction / commissioning as compared to the original design in the IFC drawings. These marked-up IFC drawings will be known as “As-Commissioned” drawings and will be used at a later stage to create the final As-Built drawings.

- The marked-up drawings may either be handwritten on printed hard copies of the IFC drawings, or electronically marked-up using a software package. The files are to be either scanned and/or saved in pdf format.
- Pdf copies may also be required to be provided to the local maintenance teams for use as interim maintenance copies of the drawings where applicable (e.g. signalling huts).
- The As-Commissioned marked-up drawing pdfs will require ARTC Acceptance from a competent ARTC discipline engineer, with signatures, as per *Section 5 Drawing Approvals and Acceptance.*
- The pdf copies of these As-Commissioned drawings are to be stored in the ARTC DMS Business Unit repository.
- Where no changes to the IFC drawings are required during either the construction or commissioning phases, As-Commissioned drawings will not be required to be supplied for updating to the ARTC DMS. For audit purposes, a note shall be included in the relevant project management plan / checklist / files to indicate the reason these files were not required as a deliverable from the project.
- An acceptable alternative to a marked-up drawing is the original IFC drawing file together with an applicable *Drawing Change Note* and *Drawing Change Note Register*.
- See *Section 6.2 Timeframes for Delivering Drawings* for timeframes required for uploading As-Commissioned drawings into the ARTC DMS.

DELIVERABLES:

1. A pdf copy of each marked-up As-Commissioned drawing with the ARTC Acceptance wet signature on each drawing (or a digital signature with evidence of the executed signing) to be stored in the ARTC DMS Business Unit repository.

2. A copy of the pdf marked-up As-Commissioned drawing file with the ARTC Acceptance wet signatures on each drawing (or a digital signature with evidence of the executed signing) to be provided to the local maintenance teams for use as an interim maintenance copy drawing, where applicable.

4.4 As-Built / Works-As-Executed

As-Built drawings are updated from the CAD version of the IFC drawings using the As-Commissioned marked-up drawings and *are required to reflect the final work as executed* from the construction / maintenance and commissioning phases.

- *The As-Built drawings importantly show the remaining infrastructure at the completion of the works*, and not the changes that were proposed, or have occurred, during construction (which are usually shown on the IFC drawings).
- The As-Builts provide the baseline starting point for any future designs or maintenance activities at that location, and hence only the remaining infrastructure is important.
- The As-Built drawing pdfs will require ARTC Acceptance from a competent ARTC discipline engineer, with signatures, as per *Section 5 Drawing Approvals and Acceptance.*
- As-Built drawings for infrastructure located in the State of Victoria, must be stored in the Public Transport Victoria (PTV) DMS. They are not stored in the ARTC DMS. See *Section 3.2 Public Transport Victoria (PTV) Drawing Management System* for more details.
- The following changes should be updated on the IFC drawings, using the As-Commissioned drawing information if applicable, to create the final As-Built drawing :
    1. Apply any required changes to the IFC drawings using the As-Commissioned drawings to represent only the works as completed.
    2. Remove any markings showing previous drawing changes, such as clouds or red line commissioning mark-ups and ensure that the drawing reflects the final status.
    3. Change any use of future tense to current or neutral tense in the IFC such as changing ‘proposed fence’ to ‘fence’.
    4. Ensure notes and cross-references are updated and correct.
    5. Remove instructions and notes specifically related to the construction process.
    6. Where numbered notes on drawings are not relevant to As-Built status, replace the note text with ‘REMOVED’ such that the note numbering is retained.
    7. Remove any background aerial imagery in IFC plan layout drawings (this decreases the file size significantly for storage in the ARTC DMS).
    8. Ensure drawing numbers are as per allocated / required by ARTC, as per procedure *EGP-04-02 ARTC Drawing Management System*.
- See *Section 6.2 Timeframes for Delivering Drawings* for timeframes required for uploading As-Built drawings into the ARTC DMS.

- **EXAMPLE AS-BUILT DRAWINGS**
    - **For example, drawings showing changes from IFC to As-Builts, refer to *APPENDIX E – As-Built Example Drawings*.**

DELIVERABLES:

1. **Bound** CAD format As-Built stamped drawing files to be stored in the ARTC DMS Business Unit repository (or PTV DMS if applicable).
2. A scanned pdf copy of each drawing with the ARTC Acceptance wet signatures on each drawing (or a digital signature with evidence of the executed signing) to be stored in the ARTC DMS Business Unit repository. See *Section 5.2 Signatures* for more information on signature requirements.

5 Drawing Approvals and Acceptance

5.1 ARTC Competency Assessment

All drawings are to be "accepted" on behalf of ARTC by an applicable *ARTC discipline competent project / maintenance engineer*.

The drawings shall be accepted as complying with the specified ARTC engineering, technical Standards, and project requirements.

This competency requirement applies for accepting all IFC, As-Commissioned and As-Built drawings.

The ARTC discipline engineer able to accept drawings on behalf of ARTC must be deemed as being "competent" as per the following procedures and competency matrix:

- *EGP-01-03 Engineering, Design and Project Management Identification of Competence*
- *EGP0103F-01 Engineering Design & Project Management Matrix*

Assessment of competence may be issued by qualified assessors, as per EGP-01-03, to appropriately qualify personnel in a range of engineering disciplines for the following Rail Industry Worker roles.

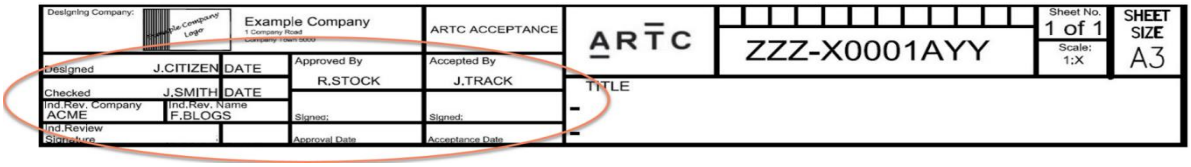
- *Scoping of Design* – Approval of design specifications that may be tendered to industry for the conduct of design.
- *Acceptance of Design* – Signing on behalf of ARTC that a design approved by an engineering design firm is acceptable for its intended use by ARTC. Acceptance that the relevant drawings submitted to ARTC are an accurate representation of the works conducted and the commissioned network ready for operational use.

5.2 Signatures

- The signatures from designers, checkers, independent reviewers / verifiers, approvers, and ARTC accepters may be either:

- Wet signatures (ie physically hand signed) on printed drawings (and the signed drawings scanned to pdf), or
- Secure digital signatures on the pdf with certification details accompanying the pdf file containing evidence of the secure signatures (e.g. Adobe Sign, DocuSign)
- *NOTE: Electronic signatures may not used (ie. a wet hand signature scanned and the image "cut / paste" into the document)*

- The name (in the form J. CITIZEN) of the designer, checker, independent reviewer / verifier, approver, and ARTC accepter of is to be included in the title block of each CAD drawing sheet. The date of each signing shall also be included.



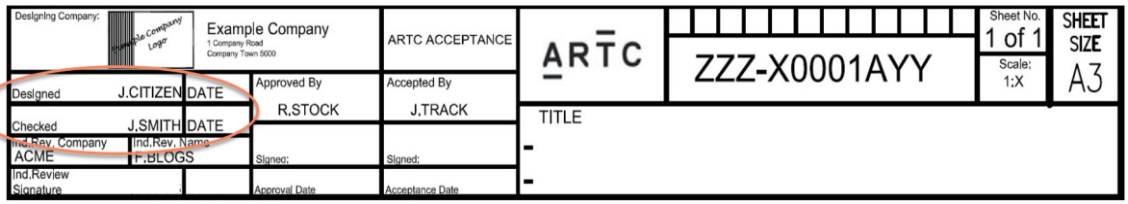
5.3 Design / Checking of Drawings

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

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

The designer and checker:

- Are required to insert their name and date into each CAD drawing title box.
- Are not required to sign the pdf copy of the drawings.



5.4 Independent Review / Verification of Drawings

An independent reviewer / verifier undertakes the role of deep professional review, at a level of detail equivalent to the calculations of the Designer, and also checks the drawings for compliance to ARTC project requirements, specified ARTC engineering, technical standards, and standard design practices and principles.

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

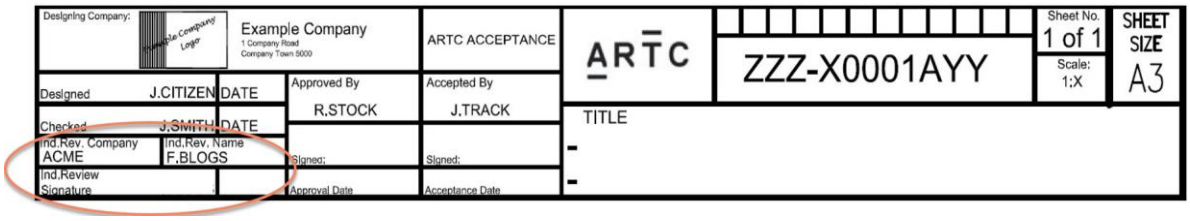
High Risk Major Structures – When high risk major structures are being designed, then a totally independent 3rd party review should be conducted where the independent reviewer is from a separate company to that of the designer.

Minor corrections to drawings e.g. typographical errors, may not require an independent review. Any minor corrections not subject to independent review shall be accompanied by a statement signed by the applicable competent 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, hence a third party independent review is not required."

The independent reviewer is to:

- Insert their name and company into the CAD drawing title box, as per *Section 2.5 Version Control*.
- Sign and date the pdf copy of each drawing in the title box as per *Section 5.2 Signatures.*



5.5 Approval of Drawings

The approver accepts overall responsibility for ensuring that the drawings have followed the process of being appropriately checked and independently reviewed, that the drawing content accurately reflects the design calculations, and provides the final approval on behalf of the organisation rendering it contractually liable for the design.

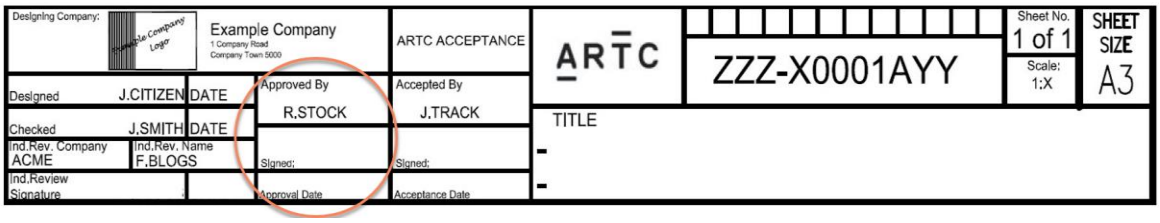
The organisation which produces the new or revised drawings is responsible for approving the drawings.

For larger projects which may have drawing sets including multiple disciplines, it's the approver's responsibility to coordinate with each discipline to ensure all project requirements are being met and that no conflicts to other designs are identified prior to signing the drawings as approved.

For smaller organisations where resources are limited, the approver may also perform the independent reviewer / verifier role as well, provided they are sufficiently separated from the designer.

The approver is to:

- Insert their name into the CAD drawing title box as per *Section 2.5 Version Control*.
- Sign and date the pdf copy of each drawing in the title box as per *Section 5.2 Signatures.*



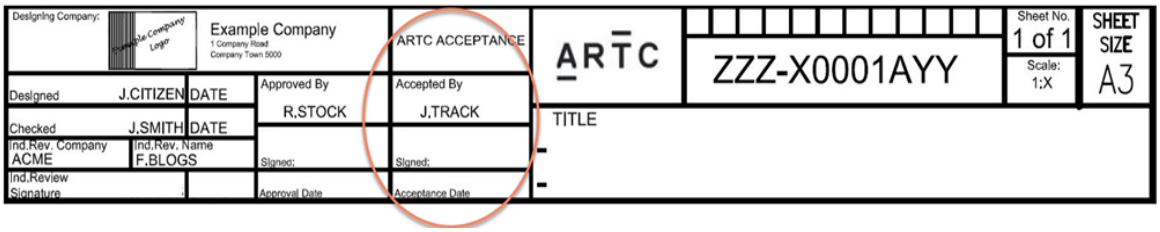
5.6 ARTC Acceptance of Drawings

All drawings must be accepted by a competent ARTC discipline engineer as complying with the specified engineering and project requirements.

For more information on “competency” requirements refer to *Section 5.1 ARTC Competency Assessment.*

The ARTC acceptor is to:

- Insert their name into each CAD drawing title box as per *Section 2.5 Version Control*.
- Sign and date the pdf copy for each drawing (or the index/cover sheet for a full set of drawings) in the title box as per *Section 5.2 Signatures.*



Large Drawing Sets

- Where large sets of drawings are involved, acceptance of the complete set may be made on the pdf copy by either wet signing or a digitally secure signature on 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.
- Where multiple engineering disciplines are contained within in a large drawing set, a table may be added to the index/cover sheet for the acceptance of multiple relevant competent ARTC discipline engineers to accept their relevant discipline drawings. The table should provide the competent ARTC engineers name, date of acceptance and engineering discipline. *There must however be one final competent ARTC engineer to take overall responsibility for the entire drawing set and provide ARTC acceptance by signing title block of the index/cover sheet.*

6 Projects / Maintenance Requirements

6.1 General Requirements

- All documents and drawings being used at any time must be the latest version for the required use.
- ARTC requires submission of design drawings for ARTC acceptance prior to issuing IFC status and commencing any construction or maintenance work as per *Section 4.2 Issued-for-Construction (IFC) / As-Designed.*
- A Bill of Materials in design drawings is encouraged to assist with procurement of items.

6.2 Timeframes for Delivering Drawings

The contractor / ARTC project manager shall provide drawings for uploading into the ARTC DMS as each stage of a project progresses as per the timeframes in the table below.

Any deviation from these timeframes must be agreed in writing by the relevant Corridor Manager (IS) / Maintenance Manager (HV) with sufficient controls in place to ensure that all necessary changes (especially where multiple works are involved) are captured, maintenance teams are advised, and the updated records provided within the amended agreed timeframe.

Drawing Type	Submit to ARTC DMS Administrator
Issued-For-Construction / As-Designed	**Within 10 business days** following Issue-For-Construction. • Bound CAD files and signed pdf copies.
As-Commissioned / As-Constructed	**At the time of Commissioning** into service. • Interim maintenance hard copy drawings to maintenance teams. **Within 10 business days** of commissioning into service. • Marked-up and signed commissioned pdf files
As-Built / Works-As-Executed	**Within 8 calendar weeks** of commissioning into service. • Bound CAD files and signed pdf copies.

6.3 Multiple Simultaneous Works

Where drawings are required for updating by more than one party / project at the same time, a *Design Interface Agreement* (DIA) / *Overlapping Design Agreement (ODA)* is required to be agreed upon by the relevant parties.

This agreement is designed to clearly detail the roles, responsibilities and processes to deliver a complete and accurate update of all drawings. The DIA /ODA shall contain the following types of information:

- Scope
- Timetable
- Responsible persons / roles
- Key milestones
- Transfer of designs between parties
- Scenarios in the event 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 involved in updating the drawings, and by an ARTC representative.

Refer to *EGP0401F-04 Design Interface Agreement Template* for the starting basis of an agreement.

6.4 Commissioning & Testing Requirements

Following the successful testing and commissioning of the assets into operational service, interim maintenance hard copies of drawings must be provided for storage and use on-site for maintainers (e.g. in signalling huts).

The required number of copies will be advised by the ARTC point of contact for the maintenance team. One copy shall be forwarded to the ARTC DMS Administrator.

Refer to *Section 6.2 Timeframes for Delivering Drawings* for the timeframes for which drawings are to be delivered.

6.5 Decommissioning of Redundant Infrastructure

Projects or maintenance activities involving the decommissioning of redundant infrastructure need to consider any related drawings and ensure they are archived in the ARTC DMS Business Unit repository and their metadata updated to indicate the reason for the change in status.

6.6 Cancelled or Deferred Projects

When a project is cancelled or deferred for any reason, and the master CAD drawings have already been issued to the project for updating, *the ARTC DMS Administrator shall be advised of the cancellation / deferral within 10 working days* so that details within the ARTC DMS may be updated and drawings released for other projects and future updates as may be required.

If a final design was achieved prior to the project being cancelled / deferred, the drawings / documents may be stored in the ARTC DMS Business Unit repository with a status of "*Information Only*" together with a note in the ARTC DMS explaining the current situation of the

project. In this situation, any 3D models created may also be stored in the ARTC DMS Business Unit repository.

If the project was cancelled / deferred prior to a final design being achieved, the incomplete design drawings and any 3D models are to be archived in the project file and not stored in the ARTC DMS.

Refer to procedure *EGP-04-02 Drawing Management System* for details on how to update the ARTC DMS in this situation.

6.7 Revision of Existing Drawings

6.7.1 General Drawing Updates

When an existing CAD drawing is to be revised, a request to the corridor 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 corridor DMS Administrator will then supply an electronic copy of the current version to the requestor. In the case of non-CAD drawings, the corridor DMS Administrator will supply an electronic copy in the available format.

Following commissioning, any outstanding or updated drawings must be booked into the ARTC DMS as per *Section 6.2 Timeframes for Delivering Drawings*. If an extension is required, it must be granted via the corridor DMS Administrator.

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

6.7.2 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 ARTC DMS (or PTV DMS) shall 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 ARTC DMS (or PTV DMS) to reflect the changes in the field, a copy of the new As-Built drawings shall 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 ARTC Corridor discipline engineer.

3. The ARTC Corridor discipline engineer will review the proposed changes with the latest master As-Built drawing held in the ARTC (or PTV) DMS and determine whether changes are required to the master As-Built copy. The ARTC Corridor discipline engineer will either authorise the change, or not. *NOTE: Any altered As-Built drawings for infrastructure in the State of Victoria must be updated in the PTV DMS.*

Authorise the Change	**Not Authorise the Change**
4. ARTC Corridor discipline engineer *Authorises* the change request drawing/document by inserting their name, position, date and signing the form. 5. ARTC Corridor discipline engineer requests to book out the relevant master As-Built drawings from the ARTC (or PTV) DMS Administrator. (Note: The preference is to update the As-Builts 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 ARTC DMS Administrator and stored in the ARTC DMS until such time as the As-Built is updated.) 6. The ARTC Corridor discipline engineer will arrange for the appropriate updates to be edited to the master As-Built drawing. 7. The ARTC Corridor discipline engineer will review the edits and ensure the checking / verification / approval / acceptance process is followed for the drawings. Refer to *Section 5.1 ARTC Competency Assessment* for competencies required for drawings. 8. The ARTC Corridor discipline engineer will return the new accepted As-Built drawing back to the ARTC (or PTV) DMS Administrator. *9.* The ARTC (or PTV) DMS Administrator will book-in the new As-Built back into the DMS to become the new master. 10. The ARTC Corridor discipline engineer will ensure the field personnel will arrange to update the field maintenance copy with the new As-Built copy.	4. ARTC Corridor discipline engineer does *Not Authorise* 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.

6.7.3 Correlation / Dilapidation Survey of In-Service Infrastructure

The latest As-Built drawings in the ARTC (or PTV) 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 ARTC (or PTV) 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 *EGP0103F-01 Engineering Design & Project Management Matrix*.
5. Any altered As-Built drawings for infrastructure in the State of Victoria 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 ARTC (or PTV) DMS Administrator.
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 ARTC (or PTV) 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 the 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 ARTC (or PTV) DMS Administrator. 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 ARTC (or PTV) DMS Administrator and the drawing is updated and booked-in to the ARTC (or PTV) 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.

6.8 Discipline Specific Drawing Requirements

Different types of drawings for the different types of engineering disciplines and infrastructure within ARTC infrastructure will be required. The types of drawings that may be applicable to these disciplines include, but are not limited to:

NOTE : NSW / QLD signalling have their own specific requirements for their drawings, refer to *APPENDIX C – NSW / QLD Signalling* Specific Requirements

Signals

- Circuit Book
- Control Panel
- Control Table
- Drivers Diagram
- Locking Table
- Signalling Plan
- Track Insulation Plan
- Detailed Site Survey
- Wayside

Electrical

- Location

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

7 APPENDIX A – Public Transport Victoria (PTV) – DMS Requirements

Note: The following information may be subject to change by PTV at any time hence confirm the currency of information with PTV prior to working with drawings for assets in the State of Victoria.

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

- ***As Built drawings only** are required to be stored in the PTV DMS.*
- 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 ARTC project team. These records are to be stored with ARTC project records and available upon request.

Issued-For-Construction and As-Commissioned drawings should also follow the PTV Infrastructure Drafting Standard and 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.

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:

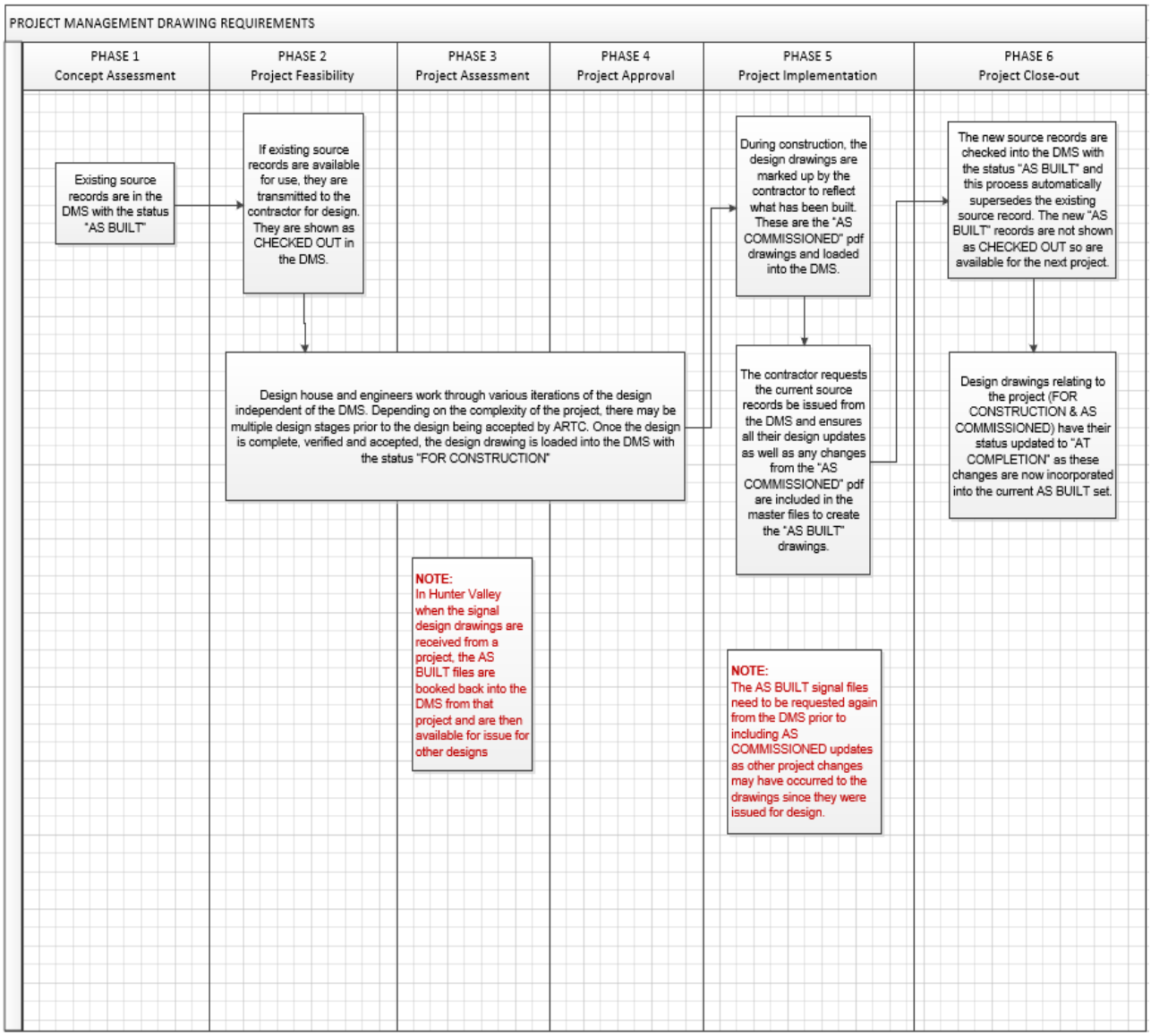
- Email - *dms@transport.vic.gov.au*
- Website - *https://dms.ptv.vic.gov.au*

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
Drawing Authoriser	Must be an employee nominated by Operator Must have the knowledge, technical skills and experience associated with the discipline specified For Signalling Diagram: must be Rail Safety Manager, Incidents Safeworking Manager or equivalent position within relevant Accredited Rail Transport Operators	Authorise for the drawings to be booked into DMS by confirming that: 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.
Drawing Certifier	Must be approved by Operator Drawing Controller or Authorisers of relevant organisation within the rail industry Must have the knowledge, technical skills and experience associated with the discipline specified	Certify drawings are an accurate representation of actual AIS condition in field. Certify drawings are prepared in accordance with the PTV Infrastructure Drafting Standard. Insert signature in accordance with the PTV Infrastructure Drafting Standard.

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

8 APPENDIX B – Project Drawings Flowchart



10 APPENDIX C – NSW / QLD Signalling Specific Requirements

For signal projects in NSW / QLD, 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 *ESD-25-03 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.***

Drawing Templates

Drawing templates are available for the following NSW / QLD signal drawings:

Design and As Built Circuit Book cover sheet

Design and As Built Control Table cover sheet

Design and As Built Circuit Book amendment sheet

Design and As Built Control Table amendment sheet

Design and As Built Circuit Book control sheet

Design and As Built Control Table control sheet

Drivers Diagram cover sheet and layout sheet

Signal Plan title block

Track Insulation Plan title block

NOTE: ***Control Table masters are a combined Excel file containing the amendment sheet, control sheet and all the individual control table sheets***.

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:

Circuit Book

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

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)

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

Track Insulation Plan

Signals

Signal rail

Glued Insulated Joint (GIJ) location

Axle Counter Heads

Track circuit name, polarity, type, bonding

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

NSW / QLD Signal Drawings Master Files Naming Convention

Document Name	Document Number (aaa = circuit book number)
Circuit Book	Refer instructions in ESD-25-01
Signal Plan	Daaa0011
Track Insulation Plan	Eaaa0011
Drivers Diagram	DDaaa001
Control Table	CTaaa001

NSW / QLD Signal Drawings Scanned Copies Naming Convention

Document Name	Document Number (aaa = circuit book number)
Circuit Book	CBaaa
Control Tables	CTaaa
Drivers Diagram	DDaaa
Detailed Site Survey	DSSaaa
Signal Plan	SPaaa
Track Insulation Plan	TIPaaa
Aspect Sequence Chart	ASCaaa
Focussing Diagram (linked with SP)	FOCaaa

NOTE: Some NSW circuit book locations consist of a 3 digit number and accompanying alphabetical letter. These locations were formerly part of a consolidated set which has now been broken down into individual locations, with the alphabetical suffix assisting to clearly delineate each location. E.g. CB186_J for Bobbiwaa and CB186_K for Bellata

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

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.

11 APPENDIX D – Track & Civil Specific Requirements

Depending upon the type and size of the project, the following track and civil drawings may be required:

- *Cover Sheet* - Cover sheet and locality plan shows the first CAD drawing of each project area CAD drawing package. It is presented to indicate general project information and a locality plan showing the full project area.
- *Drawing Index* - The drawing index identifies all CAD drawings provided at the delivery event.
- *General Notes* - General note CAD drawings describe notes which are to be read in conjunction with the full CAD drawing set delivered and typically cover all disciplines including general, non-discipline specific notes.
- *General Legend* - The general legend typically covers most of the CAD drawing package and presents key line work, symbols and other features commonly applied throughout. General legends may share the CAD drawing sheet with general notes where space permits. The rationalisation of notes and legend is permitted where discipline specific general notes and legends are necessary throughout a CAD drawing set
- *Key Plans* - Key plans show an overall plan view or views of the detailed CAD drawing sheet frames for a discipline sub-set within the full CAD drawing package. Their purpose is to enable CAD drawing stakeholders to easily identify detailed CAD drawings by location.
- *Line Diagrams* - Line diagrams present a diagrammatic layout of key track corridor features for a project area. The presentation is critical to enable each project line diagram to be collated into the Program line diagram.
- *Typical Details, Sections & Diagrams* - Typical detail, section and diagram (typical) CAD drawings are utilised for all disciplines. These CAD drawings for each specific discipline are typically ordered to open of a series of discipline CAD drawings. Typical CAD drawings may also be utilised to display information that is typical for all disciplines. When required, these general typical CAD drawings shall be placed in the information drawings series.
- *Working Plan & Sections* - The working plan and section CAD drawings are the primary CAD drawings which present the track route geometric alignment detail and how it affects the surrounding environment while showing the earthworks, rail levels and features along the design track corridor. These CAD drawings are required for all upgraded and new track, sidings, loops. etc.
- *Cross Sections* - Cross sections are provided to indicate the extents of the construction works necessary to complete the project works. They provide the designer and the client with a better understanding of the issues involved in resolving land requirement issues, for example property access. Cross sections are typically utilised for works at regular intervals along a geometric alignment.
- *Geometric Alignment Tables* - The geometric alignment tables are required to ensure the design works which are created hinging from a geometric alignment control line can be accurately located on site. Key geometric alignment data such as; kilometrage and

chainage, element linear lengths and geometry data, and coordinates of points are presented in tabulated convention to enable the set out of the control lines on site.

- *Public Utility Plant (PUP) Plan & Section* - The PUP plan and section CAD drawings provide a construction solution that identifies risks and supports the relocation of existing utilities to enable the service to be maintained during construction. PUP infrastructure works require that asset owner's and land stakeholders' standards are followed to determine the level of detail that is required for these CAD drawings.
- *Culvert Plan & Section* - Culvert plan and section CAD drawings are to clearly show location and orientation of culverts and the linkage between the culverts and all surrounding infrastructure works, for example outlet diversion channel earthworks, track formation and earthworks.
- *Bridge General Arrangement* - The bridge general arrangement CAD drawings are to provide an overall view of the bridge layout and how it affects its surrounding environment while showing the earthworks, levels and features to be constructed.
- *Signalling Civil Detail* - Signalling civil detail CAD drawings are provided to give the reader information of the works to be undertaken and providing references to where the details, design and construction methodology CAD drawings are located. The layout is to clearly show where the works occurring are located and how it interfaces with the surrounding environment as well as where the works start and end.
- *Level Crossings* - Level crossing CAD drawings shall present the design as consulted and agreed with the level crossing stakeholders to provide at-grade public road and private access across the track.

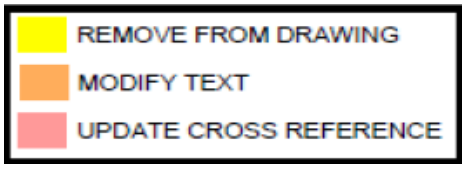
12 APPENDIX E – As-Built Example Drawings

The following sample set of drawings was selected to represent examples of Track and Civil deliverables for changes required from IFC to As-Built drawings.

The drawings demonstrate how Inland Rail mark-up their IFC's to feed back to the designer the changes required to ensure the final As-Builts comply with *Section 4.4 As-Built / Works-As-Executed.*

This methodology is recommended for other projects to follow as best practice within ARTC.

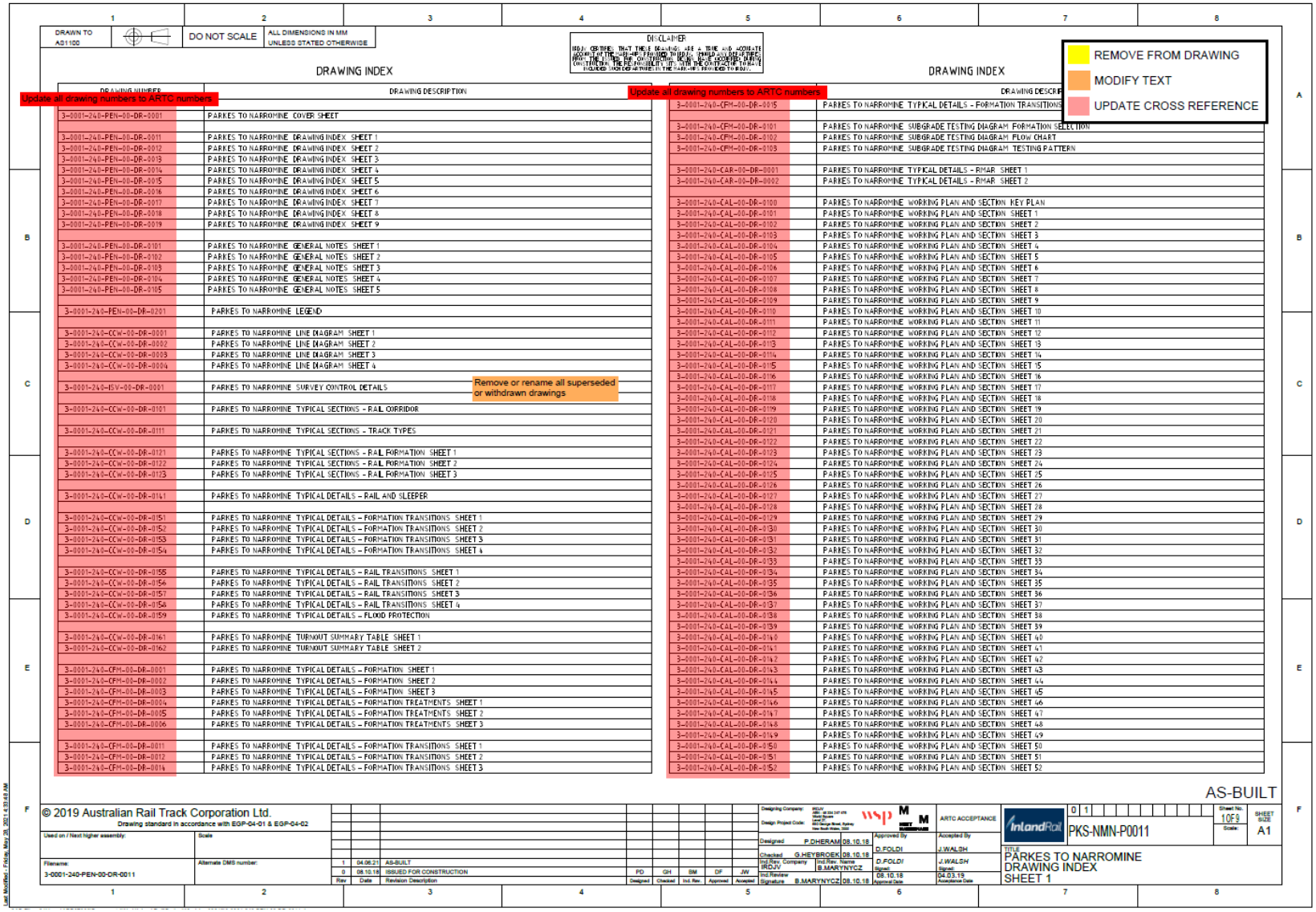
The drawings were marked-up using the following colour coding:



Examples drawings include:

1. Index Sheet
2. Line Diagram
3. Typical Sections – Rail Corridor
4. Working Plan and Section
5. Alignment Details (Tables)
6. General Arrangement
7. Site Layout – Level Crossing
8. Longitudinal Section
9. Culvert Plan and Section
10. Utilities Schedule
11. Landscape Treatment Plan

1. INDEX SHEET



DRAWN TO AS1100 | DO NOT SCALE | ALL DIMENSIONS IN MM UNLESS STATED OTHERWISE

DISCLAIMER

REMOVE FROM DRAWING
MODIFY TEXT
UPDATE CROSS REFERENCE

Update all drawing numbers to ARTC numbers

DRAWING INDEX

DRAWING NUMBER	DRAWING DESCRIPTION
3-0001-240-PEN-00-DR-0001	PARKES TO NARROMINE COVER SHEET
3-0001-240-PEN-00-DR-0011	PARKES TO NARROMINE DRAWING INDEX SHEET 1
3-0001-240-PEN-00-DR-0012	PARKES TO NARROMINE DRAWING INDEX SHEET 2
3-0001-240-PEN-00-DR-0013	PARKES TO NARROMINE DRAWING INDEX SHEET 3
3-0001-240-PEN-00-DR-0014	PARKES TO NARROMINE DRAWING INDEX SHEET 4
3-0001-240-PEN-00-DR-0015	PARKES TO NARROMINE DRAWING INDEX SHEET 5
3-0001-240-PEN-00-DR-0016	PARKES TO NARROMINE DRAWING INDEX SHEET 6
3-0001-240-PEN-00-DR-0017	PARKES TO NARROMINE DRAWING INDEX SHEET 7
3-0001-240-PEN-00-DR-0018	PARKES TO NARROMINE DRAWING INDEX SHEET 8
3-0001-240-PEN-00-DR-0019	PARKES TO NARROMINE DRAWING INDEX SHEET 9
3-0001-240-PEN-00-DR-0101	PARKES TO NARROMINE GENERAL NOTES SHEET 1
3-0001-240-PEN-00-DR-0102	PARKES TO NARROMINE GENERAL NOTES SHEET 2
3-0001-240-PEN-00-DR-0103	PARKES TO NARROMINE GENERAL NOTES SHEET 3
3-0001-240-PEN-00-DR-0104	PARKES TO NARROMINE GENERAL NOTES SHEET 4
3-0001-240-PEN-00-DR-0105	PARKES TO NARROMINE GENERAL NOTES SHEET 5
3-0001-240-PEN-00-DR-0201	PARKES TO NARROMINE LEGEND
3-0001-240-CCW-00-DR-0001	PARKES TO NARROMINE LINE DIAGRAM SHEET 1
3-0001-240-CCW-00-DR-0002	PARKES TO NARROMINE LINE DIAGRAM SHEET 2
3-0001-240-CCW-00-DR-0003	PARKES TO NARROMINE LINE DIAGRAM SHEET 3
3-0001-240-CCW-00-DR-0004	PARKES TO NARROMINE LINE DIAGRAM SHEET 4
3-0001-240-ISV-00-DR-0001	PARKES TO NARROMINE SURVEY CONTROL DETAILS
3-0001-240-CCW-00-DR-0101	PARKES TO NARROMINE TYPICAL SECTIONS - RAIL CORRIDOR
3-0001-240-CCW-00-DR-0111	PARKES TO NARROMINE TYPICAL SECTIONS - TRACK TYPES
3-0001-240-CCW-00-DR-0121	PARKES TO NARROMINE TYPICAL SECTIONS - RAIL FORMATION SHEET 1
3-0001-240-CCW-00-DR-0122	PARKES TO NARROMINE TYPICAL SECTIONS - RAIL FORMATION SHEET 2
3-0001-240-CCW-00-DR-0123	PARKES TO NARROMINE TYPICAL SECTIONS - RAIL FORMATION SHEET 3
3-0001-240-CCW-00-DR-0141	PARKES TO NARROMINE TYPICAL DETAILS - RAIL AND SLEEPER
3-0001-240-CCW-00-DR-0151	PARKES TO NARROMINE TYPICAL DETAILS - FORMATION TRANSITIONS SHEET 1
3-0001-240-CCW-00-DR-0152	PARKES TO NARROMINE TYPICAL DETAILS - FORMATION TRANSITIONS SHEET 2
3-0001-240-CCW-00-DR-0153	PARKES TO NARROMINE TYPICAL DETAILS - FORMATION TRANSITIONS SHEET 3
3-0001-240-CCW-00-DR-0154	PARKES TO NARROMINE TYPICAL DETAILS - FORMATION TRANSITIONS SHEET 4
3-0001-240-CCW-00-DR-0155	PARKES TO NARROMINE TYPICAL DETAILS - RAIL TRANSITIONS SHEET 1
3-0001-240-CCW-00-DR-0156	PARKES TO NARROMINE TYPICAL DETAILS - RAIL TRANSITIONS SHEET 2
3-0001-240-CCW-00-DR-0157	PARKES TO NARROMINE TYPICAL DETAILS - RAIL TRANSITIONS SHEET 3
3-0001-240-CCW-00-DR-0158	PARKES TO NARROMINE TYPICAL DETAILS - RAIL TRANSITIONS SHEET 4
3-0001-240-CCW-00-DR-0159	PARKES TO NARROMINE TYPICAL DETAILS - FLOOD PROTECTION
3-0001-240-CCW-00-DR-0161	PARKES TO NARROMINE TURNOUT SUMMARY TABLE SHEET 1
3-0001-240-CCW-00-DR-0162	PARKES TO NARROMINE TURNOUT SUMMARY TABLE SHEET 2
3-0001-240-CFM-00-DR-0001	PARKES TO NARROMINE TYPICAL DETAILS - FORMATION SHEET 1
3-0001-240-CFM-00-DR-0002	PARKES TO NARROMINE TYPICAL DETAILS - FORMATION SHEET 2
3-0001-240-CFM-00-DR-0003	PARKES TO NARROMINE TYPICAL DETAILS - FORMATION SHEET 3
3-0001-240-CFM-00-DR-0004	PARKES TO NARROMINE TYPICAL DETAILS - FORMATION TREATMENTS SHEET 1
3-0001-240-CFM-00-DR-0005	PARKES TO NARROMINE TYPICAL DETAILS - FORMATION TREATMENTS SHEET 2
3-0001-240-CFM-00-DR-0006	PARKES TO NARROMINE TYPICAL DETAILS - FORMATION TREATMENTS SHEET 3
3-0001-240-CFM-00-DR-0011	PARKES TO NARROMINE TYPICAL DETAILS - FORMATION TRANSITIONS SHEET 1
3-0001-240-CFM-00-DR-0012	PARKES TO NARROMINE TYPICAL DETAILS - FORMATION TRANSITIONS SHEET 2
3-0001-240-CFM-00-DR-0014	PARKES TO NARROMINE TYPICAL DETAILS - FORMATION TRANSITIONS SHEET 3

Remove or rename all superseded or withdrawn drawings

Update all drawing numbers to ARTC numbers

DRAWING INDEX

DRAWING NUMBER	DRAWING DESCRIPTION
3-0001-240-CFM-00-DR-0015	PARKES TO NARROMINE TYPICAL DETAILS - FORMATION TRANSITIONS
3-0001-240-CFM-00-DR-0101	PARKES TO NARROMINE SUBGRADE TESTING DIAGRAM FORMATION SELECTION
3-0001-240-CFM-00-DR-0102	PARKES TO NARROMINE SUBGRADE TESTING DIAGRAM FLOW CHART
3-0001-240-CFM-00-DR-0103	PARKES TO NARROMINE SUBGRADE TESTING DIAGRAM TESTING PATTERN
3-0001-240-CAR-00-DR-0001	PARKES TO NARROMINE TYPICAL DETAILS - RMAR SHEET 1
3-0001-240-CAR-00-DR-0002	PARKES TO NARROMINE TYPICAL DETAILS - RMAR SHEET 2
3-0001-240-CAL-00-DR-0100	PARKES TO NARROMINE WORKING PLAN AND SECTION KEY PLAN
3-0001-240-CAL-00-DR-0101	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 1
3-0001-240-CAL-00-DR-0102	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 2
3-0001-240-CAL-00-DR-0103	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 3
3-0001-240-CAL-00-DR-0104	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 4
3-0001-240-CAL-00-DR-0105	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 5
3-0001-240-CAL-00-DR-0106	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 6
3-0001-240-CAL-00-DR-0107	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 7
3-0001-240-CAL-00-DR-0108	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 8
3-0001-240-CAL-00-DR-0109	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 9
3-0001-240-CAL-00-DR-0110	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 10
3-0001-240-CAL-00-DR-0111	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 11
3-0001-240-CAL-00-DR-0112	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 12
3-0001-240-CAL-00-DR-0113	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 13
3-0001-240-CAL-00-DR-0114	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 14
3-0001-240-CAL-00-DR-0115	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 15
3-0001-240-CAL-00-DR-0116	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 16
3-0001-240-CAL-00-DR-0117	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 17
3-0001-240-CAL-00-DR-0118	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 18
3-0001-240-CAL-00-DR-0119	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 19
3-0001-240-CAL-00-DR-0120	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 20
3-0001-240-CAL-00-DR-0121	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 21
3-0001-240-CAL-00-DR-0122	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 22
3-0001-240-CAL-00-DR-0123	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 23
3-0001-240-CAL-00-DR-0124	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 24
3-0001-240-CAL-00-DR-0125	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 25
3-0001-240-CAL-00-DR-0126	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 26
3-0001-240-CAL-00-DR-0127	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 27
3-0001-240-CAL-00-DR-0128	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 28
3-0001-240-CAL-00-DR-0129	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 29
3-0001-240-CAL-00-DR-0130	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 30
3-0001-240-CAL-00-DR-0131	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 31
3-0001-240-CAL-00-DR-0132	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 32
3-0001-240-CAL-00-DR-0133	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 33
3-0001-240-CAL-00-DR-0134	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 34
3-0001-240-CAL-00-DR-0135	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 35
3-0001-240-CAL-00-DR-0136	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 36
3-0001-240-CAL-00-DR-0137	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 37
3-0001-240-CAL-00-DR-0138	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 38
3-0001-240-CAL-00-DR-0139	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 39
3-0001-240-CAL-00-DR-0140	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 40
3-0001-240-CAL-00-DR-0141	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 41
3-0001-240-CAL-00-DR-0142	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 42
3-0001-240-CAL-00-DR-0143	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 43
3-0001-240-CAL-00-DR-0144	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 44
3-0001-240-CAL-00-DR-0145	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 45
3-0001-240-CAL-00-DR-0146	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 46
3-0001-240-CAL-00-DR-0147	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 47
3-0001-240-CAL-00-DR-0148	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 48
3-0001-240-CAL-00-DR-0149	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 49
3-0001-240-CAL-00-DR-0150	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 50
3-0001-240-CAL-00-DR-0151	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 51
3-0001-240-CAL-00-DR-0152	PARKES TO NARROMINE WORKING PLAN AND SECTION SHEET 52

AS-BUILT

Rev	Date	Revision Description
1	04.06.21	AS-BUILT
0	08.10.18	ISSUED FOR CONSTRUCTION

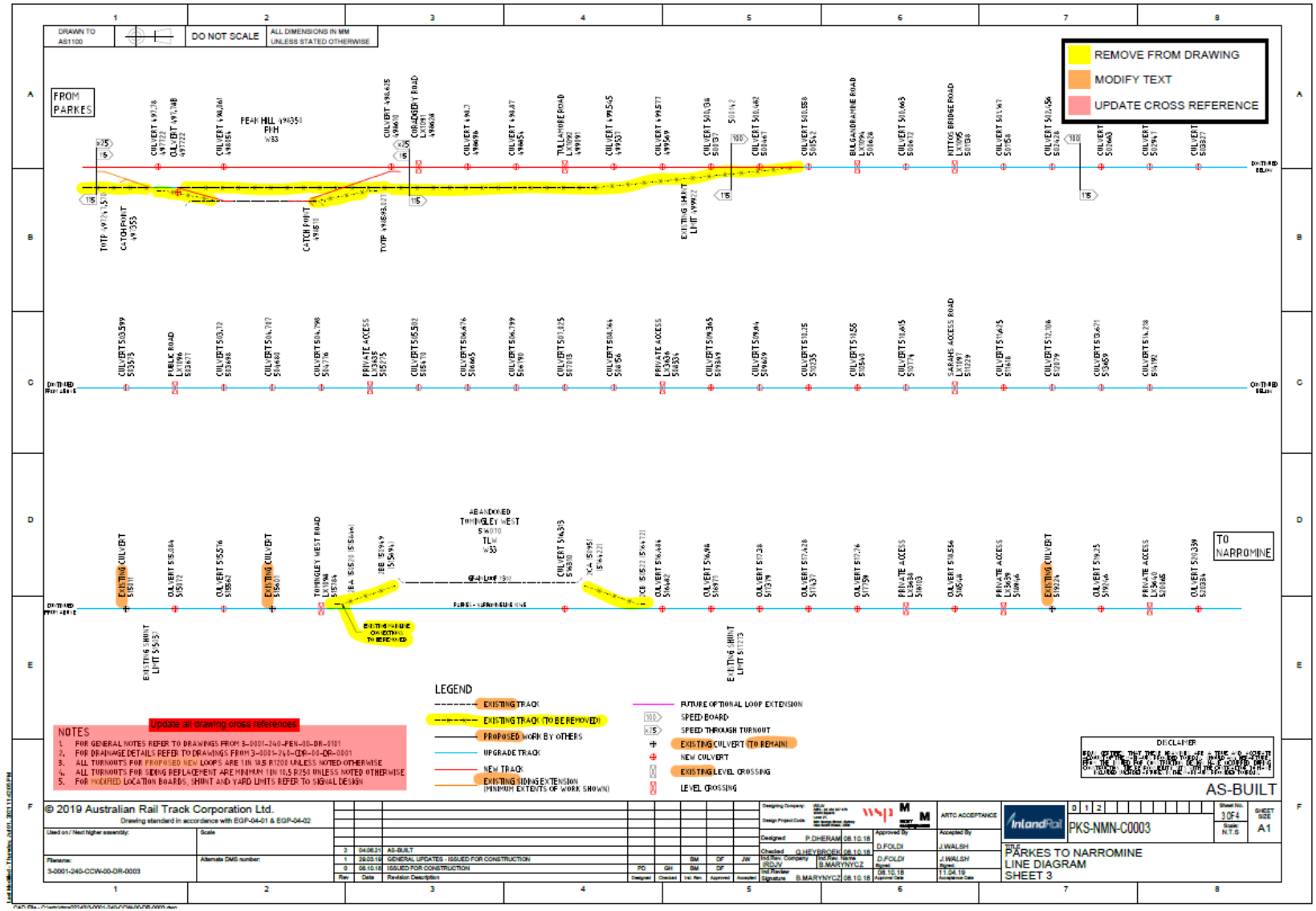
Designed P.DHERAM 08.10.18
Checked G.HEYBROEK 08.10.18
Ind.Rev. Company IRDJV Name B.MARYNYCZ
Ind.Review Signed 08.10.18
Approved By D.FOLDI
Accepted By J.WALSH
04.03.19

Filename: 3-0001-240-PEN-00-DR-0011
Alternate DMS number:
Used on / Next higher assembly:
Scale

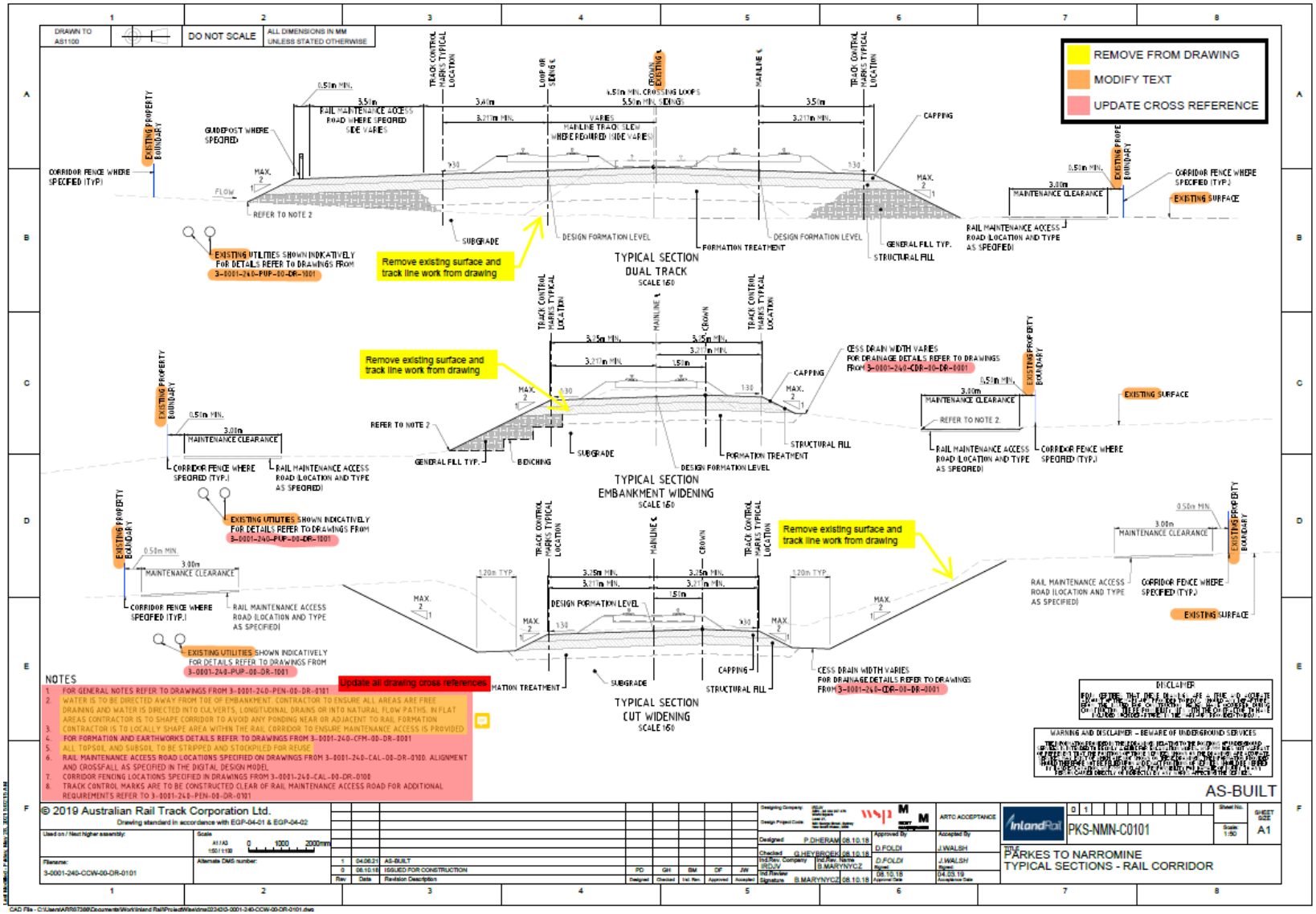
ARTC ACCEPTANCE
InlandRail
PKS-NMN-P0011
Sheet No. 1 OF 9
SHEET SIZE A1

TITLE
PARKES TO NARROMINE
DRAWING INDEX
SHEET 1

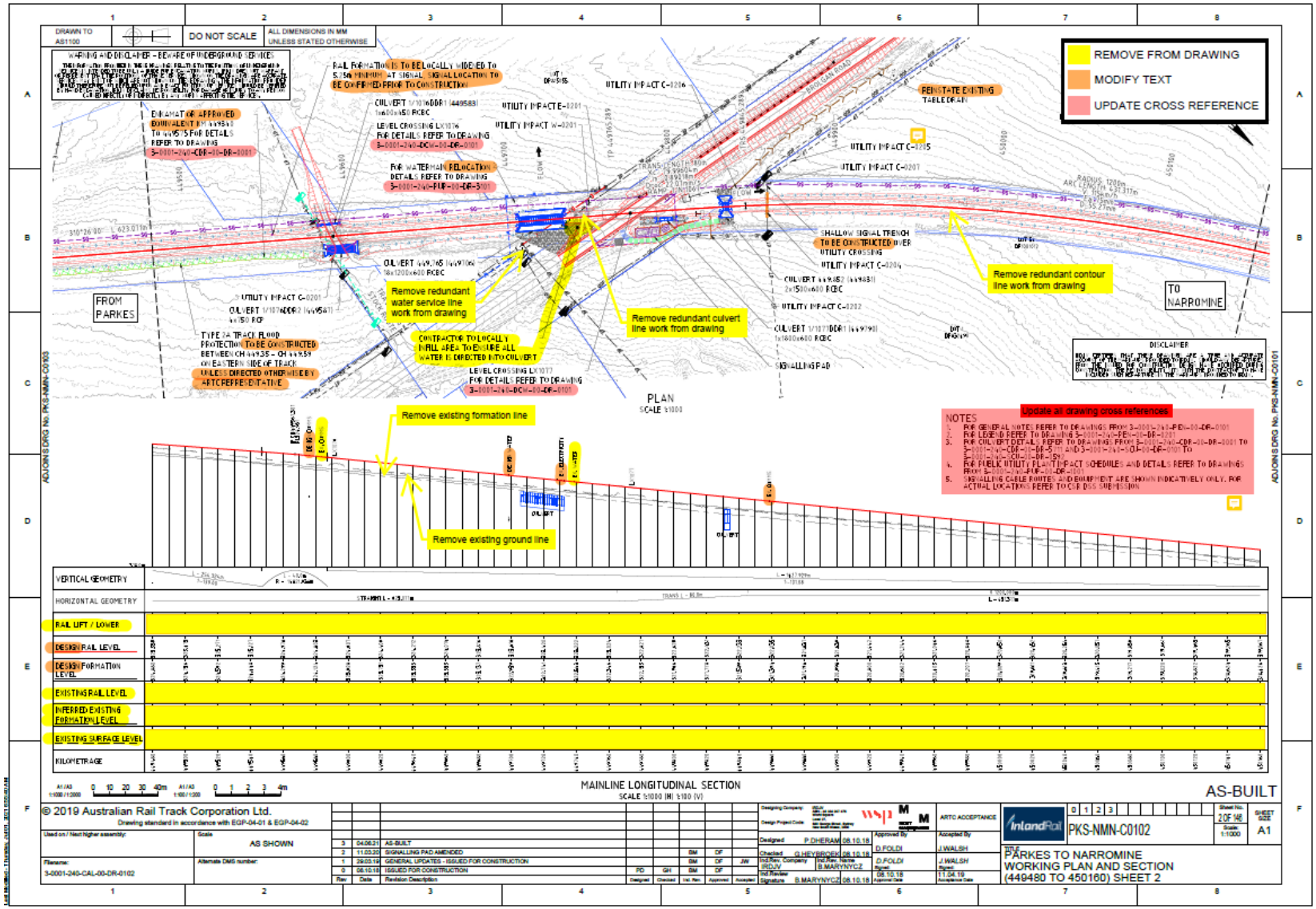
2. LINE DIAGRAM



3. TYPICAL SECTIONS



4. WORKING PLAN AND SECTIONS



5. ALIGNMENT DETAILS

DRAWN TO AS1100 | DO NOT SCALE | ALL DIMENSIONS IN MM UNLESS STATED OTHERWISE

REMOVE FROM DRAWING
MODIFY TEXT
UPDATE CROSS REFERENCE

MAINLINE GEOMETRY

ELEMENT	PT	KILOMETRAGE	NORTHING	EASTING	BEARING	LENGTH	RADIUS
LINEAR	START OF DESIGN	449142.217	6333018.724715	606101.337172	310°25'59.88"	623.071	
NSW CUBIC PARABOLA	TP	449765.289	6333422.825286	605627.079326	310°25'59.88"	80.000	
CIRCULAR	TRS	449845.289	6333475.342063	605566.770526	312°20'43.54"	431.317	1200.000
	PI		6333622.233721	605405.639503			
	CC		6334362.298751	606375.089021			
NSW CUBIC PARABOLA	TRS	450276.606	6333816.377601	605306.459011	332°56'21.46"	80.000	
LINEAR	TP	450356.606	6333888.407942	605271.659641	334°51'05.12"	1200.265	
NSW CUBIC PARABOLA	TP	451556.871	6334974.898691	604761.586458	334°51'05.12"	40.000	
CIRCULAR	TRS	451596.871	6335011.155835	604744.692412	335°20'51.11"	340.533	2310.000
	PI		6335166.184125	604673.543119			
	CC		6335974.687480	606844.146334			
NSW CUBIC PARABOLA	TRS	451937.404	6335329.981603	604625.936621	343°47'38.02"	40.000	
LINEAR	TP	451977.404	6335368.455834	604614.994825	344°17'24.00"	2182.921	
NSW CUBIC PARABOLA	TP	454160.325	6337469.832577	604023.928721	344°17'24.00"	50.000	
CIRCULAR	TRS	454210.325	6337518.021026	604010.593133	345°00'48.80"	478.215	1980.000
	PI		6337750.125254	603948.459842			
	CC		6338030.030254	605923.247454			
NSW CUBIC PARABOLA	TRS	454688.540	6337990.353762	603943.645025	358°51'06.46"	50.000	
LINEAR	TP	454738.540	6338040.350031	603943.063981	359°34'31.26"	2672.448	
NSW CUBIC PARABOLA	TP	457410.988	6340712.724639	603923.257166	359°34'31.26"	50.000	
CIRCULAR	TRS	457460.988	6340762.724028	603923.095994	0°17'42.96"	519.274	1990.000
	PI		6341023.841070	603924.441638			
	CC		6340752.468873	605913.069570			
NSW CUBIC PARABOLA	TRS	457980.262	6341275.771461	603993.107486	15°14'46.08"	50.000	
LINEAR	TP	458030.262	6341323.899550	604006.659312	15°57'57.79"	3516.126	
NSW CUBIC PARABOLA	TP	461546.388	6344704.390560	604973.832234	15°57'57.79"	120.000	
CIRCULAR	TRS	461666.388	6344820.505462	605004.006260	11°46'30.81"	355.312	-825.000
	PI		6344997.162119	605040.832041			
	CC		6344988.865476	604196.367786			
NSW CUBIC PARABOLA	TRS	462021.701	6345173.061139	605000.542492	347°05'56.33"	120.000	
LINEAR	TP	462141.701	6345288.560780	604968.092913	342°54'29.35"	568.848	
NSW CUBIC PARABOLA	TP	462710.549	6345832.285460	604800.906036	342°54'29.35"	110.000	
CIRCULAR	TRS	462820.549	6345937.990296	604770.521663	346°04'10.63"	530.983	1000.000
	PI		6346201.903327	604705.061531			
	CC		6346178.732090	605741.110459			
NSW CUBIC PARABOLA	TRS	463351.531	6346462.625909	604782.255135	16°29'33.86"	110.000	
LINEAR	TP	463461.531	6346566.866639	604817.334940	19°39'15.34"	3498.496	
NSW CUBIC PARABOLA	TP	466960.027	6349861.537757	605994.031508	19°39'15.34"	60.000	
CIRCULAR	TRS	467020.027	6349917.939131	606014.496402	20°31'13.45"	487.135	1985.000
	PI		6350147.203518	606100.307910			
	CC		6349222.115429	607873.543033			
NSW CUBIC PARABOLA	TRS	467507.162	6350348.150640	606239.248659	34°34'52.52"	60.000	
LINEAR	TP	467567.162	6350397.803775	606273.798866	35°26'50.63"	5426.244	

MAINLINE GEOMETRY

ELEMENT	PT	KILOMETRAGE	NORTHING	EASTING	BEARING	LENGTH	RADIUS
NSW CUBIC PARABOLA	TP	472993.406	6354818.284399	609420.777776	35°26'50.63 [illegible]	[illegible]	[illegible]
CIRCULAR	TRS	473073.406	6354883.965265	609466.443847	33°32'06,9 [illegible]	[illegible]	[illegible]
	PI		6355125.075517	609626.244756			
	CC		6355546.905459	608466.188730			
NSW CUBIC PARABOLA	TRS	473641.094	6355412.514311	609658.639576	6°25'48.70"	80.000	
LINEAR	TP	473721.094	6355492.186706	609665.828157	4°31'05.03"	5609.322	
NSW CUBIC PARABOLA	TP	479330.415	6361084.077624	610107.693520	4°31'05.03"	80.000	
CIRCULAR	TRS	479410.415	6361163.750019	610114.882101	6°25'48.70"	666.642	1200.000
	PI		6361503,763924	610153,202221			
	CC		6361029,358871	611307,332946			
NSW CUBIC PARABOLA	TRS	480077.057	6361772.436065	610365,042299	38°15'36.00"	80.000	
LINEAR	TP	480157.057	6361834.132268	610416.003241	40°10'19.67"	3169.711	
NSW CUBIC PARABOLA	TP	483326.768	6364256.139598	612460.739427	40°10'19.67"	100.000	
CIRCULAR	TRS	483426.768	6364333.610027	612523.954117	37°11'58.73"	675.793	-1000.000
	PI		6364613.118541	612736.879825			
	CC		6364939.593529	611728.476905			
NSW CUBIC PARABOLA	TRS	484102.561	6364964,382684	612728,169607	358°34'46.35"	100.000	
LINEAR	TP	484202.561	6365064,202198	612722,353334	355°42'25.41"	2122.292	
NSW CUBIC PARABOLA	TP	486324.853	6367180.540098	612563.487306	355°42'25.41"	120.000	
CIRCULAR	TRS	486444.853	6367300.346297	612557.067976	359°22'49.13"	436.997	940.000
	PI		6367522.853165	612554.661336			
	CC		6367310.512740	613497.012997			
NSW CUBIC PARABOLA	TRS	486881.850	6367722.825663	612652.265666	26°00'59.59"	120.000	
LINEAR	TP	487001,850	6367828,300484	612709,447790	29°41'23.30"	1529,893	
NSW CUBIC PARABOLA	TP	488531,743	6369157,348681	613467,210114	29°41'23.30"	125,000	
CIRCULAR	TRS	488656,743	6369267,487233	613526,252502	25°12'44.22"	203.622	-805.000
	PI		6369360.093516	613569.853962			
	CC		6369610.395693	612797.940215			
NSW CUBIC PARABOLA	TRS	488860.365	6369460.664605	613588.892553	10°43'10.27"	125.000	
LINEAR	TP	488985.365	6369584.492924	613605.716694	6°14'31.18"	1509.924	
NSW CUBIC PARABOLA	TP	490495,289	6371085,465566	613769,887730	6°14'31,18"	125,000	
CIRCULAR	TRS	490620,289	6371210,002964	613780,228946	1°45'52,10"	257,584	-805,000
	PI		6371339,843499	613784,228761			
	CC		6371234,789706	612975,610641			
NSW CUBIC PARABOLA	TRS	490877.873	6371464.351690	613747.184549	343°25'51.53"	125.000	
LINEAR	TP	491002.873	6371582.112420	613705.364521	338°57'12.44"	934.832	
NSW CUBIC PARABOLA	TP	491937.705	6372454.580471	613369.641982	338°57'12.44"	100.000	
CIRCULAR	TRS	492037.705	6372547.191657	613331.955874	335°40'04.45"	371.864	-875.000
	PI		6372719,204799	613254,172927			
	CC		6372186,669907	612534,679844			
NSW CUBIC PARABOLA	TRS	492409.569	6372843.845633	613112.386574	311°19'04.42"	100.000	
LINEAR	TP	492509.569	6372906.942703	613034.824765	308°01'56.43"	650.968	
NSW CUBIC PARABOLA	TP	493160.537	6373308.007917	612522.081528	308°01'56.43"	125.000	

NOTES

Update all drawing cross references

1. FOR GENERAL NOTES REFER TO DRAWINGS FROM 3-0001-240-PEN-00-DR-0101
2. FOR ALIGNMENT AND VERTICAL GEOMETRY REFER TO DRAWINGS FROM 3-0001-240-CAL-00-DR-0101
3. FOR MAINLINE SETOUT REFER TO DRAWINGS FROM 3-0001-240-CAL-00-DR-2051
4. FOR NORTH WEST LINK ALIGNMENT DETAILS REFER TO DRAWINGS FROM 3-0001-240-CAL-00-DR-0101
5. FOR SIDING AND CROSSING LOOP ALIGNMENT DETAILS REFER TO DRAWINGS FROM 3-0001-240-CAL-00-DR-3101

DISCLAIMER

IRDJV CERTIFIES THAT THESE DRAWINGS ARE A TRUE AND ACCURATE ACCOUNT OF THE MARK-UPS PROVIDED TO IRDJV. SHOULD ANY DEPARTURES FROM THE ISSUED FOR CONSTRUCTION DESIGN HAVE OCCURRED DURING CONSTRUCTION, THE RESPONSIBILITY SITS WITH THE CONTRACTOR TO HAVE INCLUDED SUCH DEPARTURES IN THE MARK-UPS PROVIDED TO IRDJV.

AS-BUILT

Drawing standard in accordance with EGP-04-01 & EGP-04-02

Used on / Next higher assembly:
Scale
Filename: 3-0001-240-CAL-00-DR-2001
Alternate DMS number:

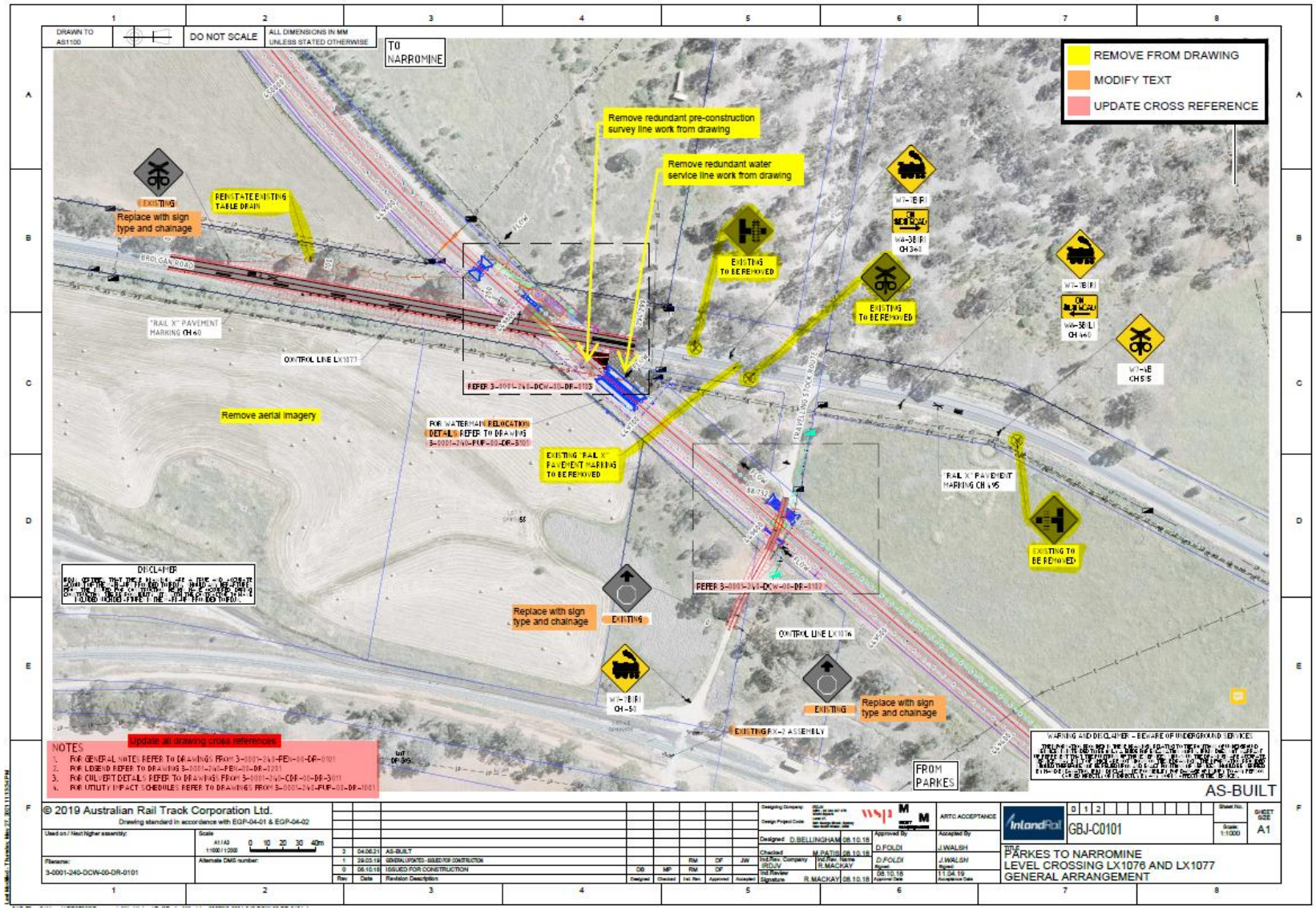
Rev	Date	Revision Description	Designed	Checked	Ind Rev	Approved	Accepted
1	04.06.21	AS-BUILT					
0	08.10.18	ISSUED FOR CONSTRUCTION	PD	GH	BM	DF	JW

Designing Company: IRDJV
Design Project Code:
Designed P.DHERAM 08.10.18
Checked G.HEYBROEK 08.10.18
Ind.Rev. Company IRDJV
Ind.Rev. Name B.MARYNYCZ
Ind.Review Signature B.MARYNYCZ 08.10.18
Approved By D.FOLDI
D.FOLDI Signed
08.10.18 Approval Date
ARTC ACCEPTANCE
Accepted By J.WALSH
J.WALSH Signed
04.03.19 Acceptance Date

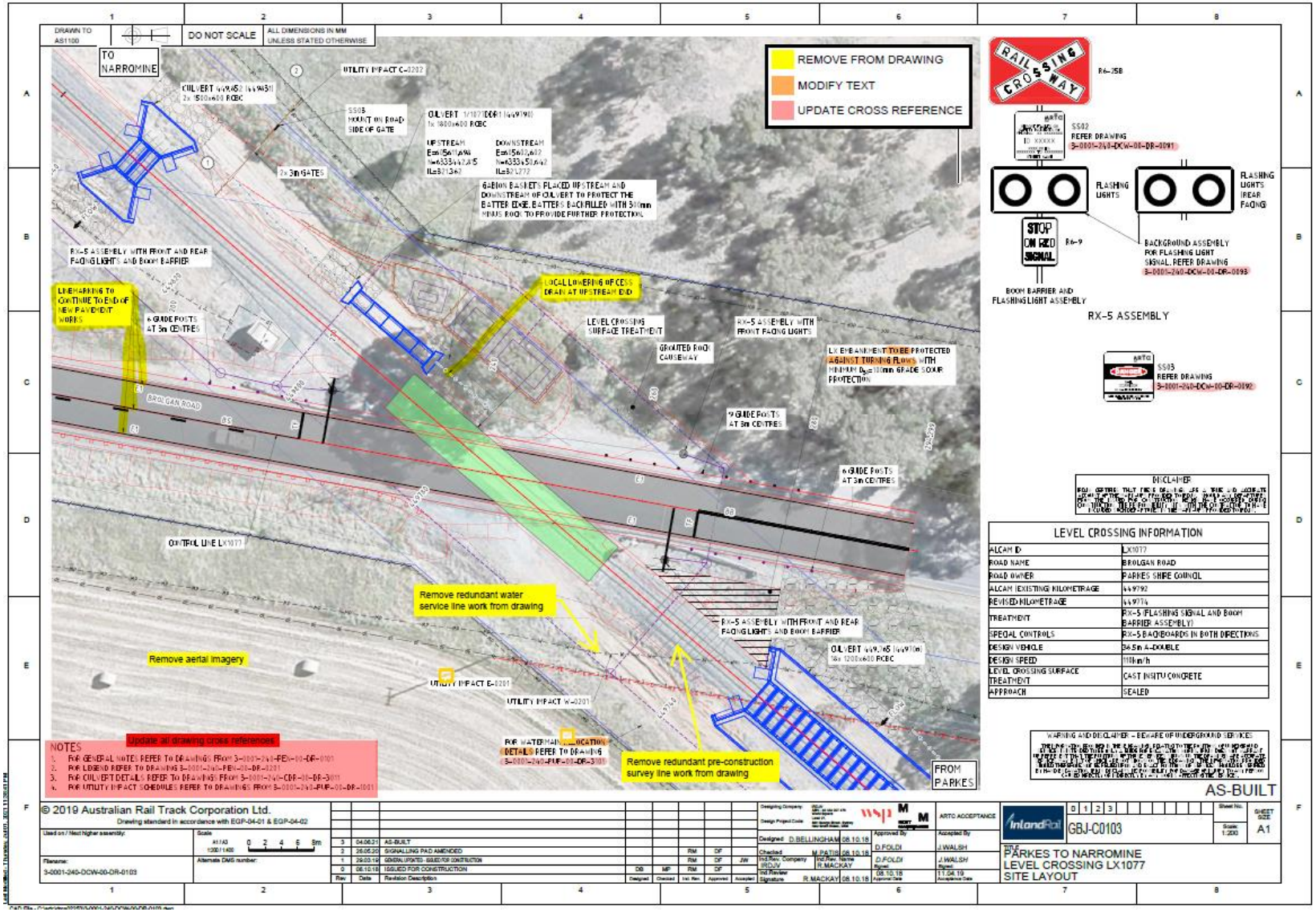
InlandRail
0 1
PKS-NMN-C2001
Sheet No. 1 OF 3
Scale:
SHEET SIZE A1

TITLE
PARKES TO NARROMINE
ALIGNMENT DETAILS
MAINLINE GEOMETRY SHEET 1

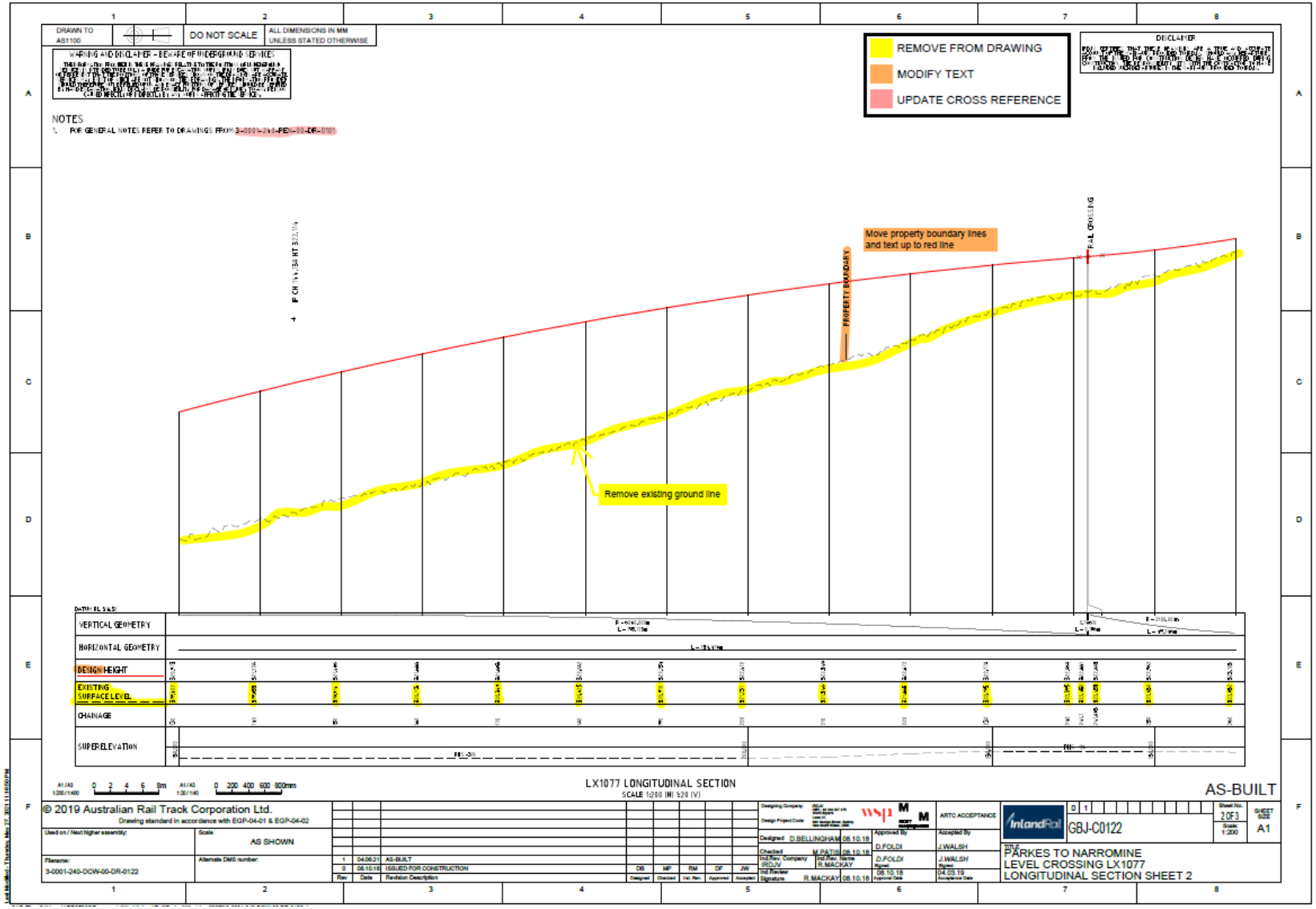
6. GENERAL ARRANGEMENT



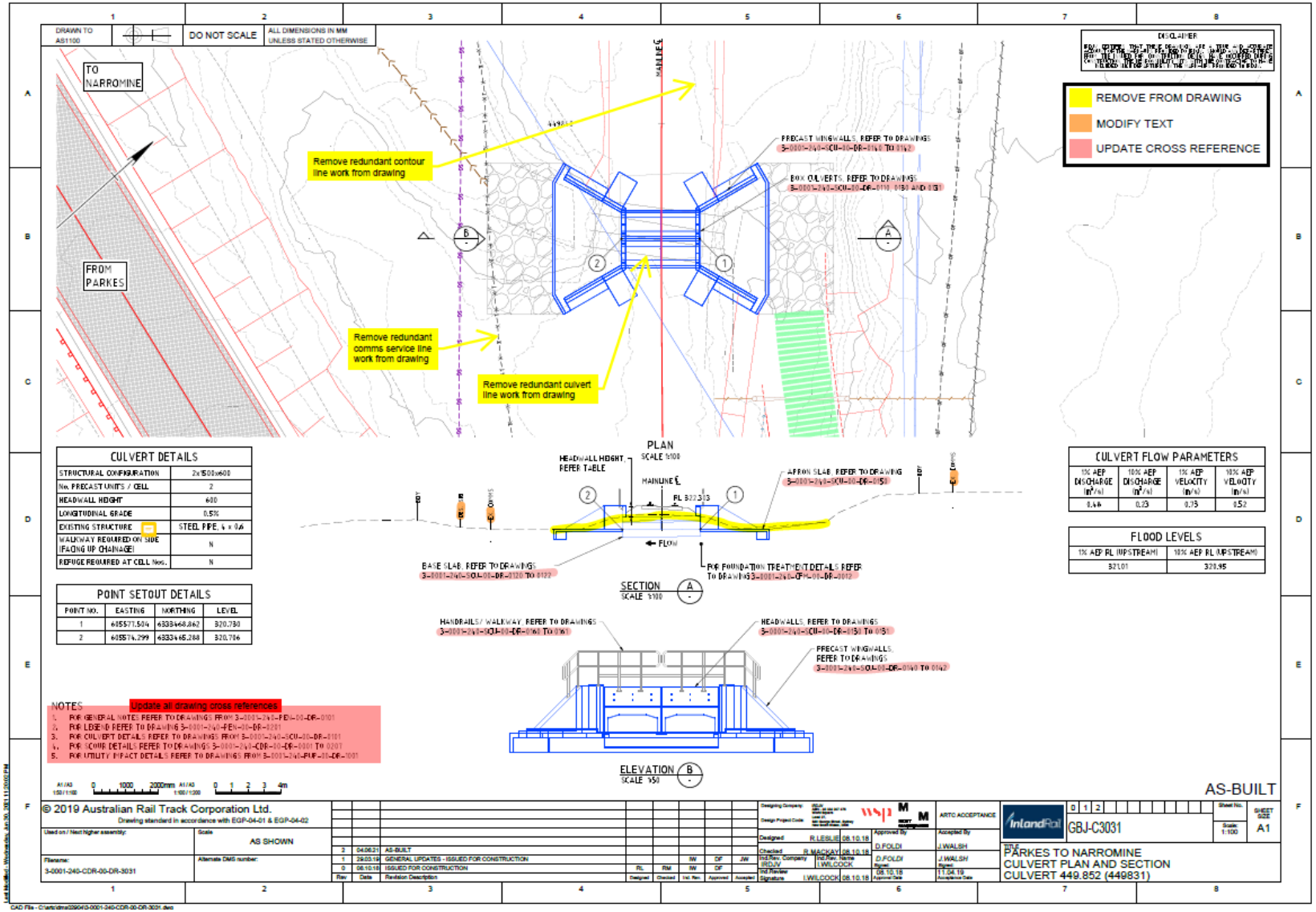
7. SITE LAYOUT – LEVEL CROSSING



8. LONGITUDINAL SECTION



9. CULVERT PLAN AND SECTION



10. UTILITY SCHEDULE

DRAWN TO AS1100 | DO NOT SCALE | ALL DIMENSIONS IN MM UNLESS STATED OTHERWISE

EXAMPLE UTILITY SCHEDULE AS BUILT

COMMUNICATION IMPACT SCHEDULE

UTILITY SPECIFIC ID	UTILITY OWNER	UTILITY TYPE	CHAINAGE	UTILITY DESCRIPTION	TREATMENT	NEW UTILITY	LENGTH OF NEW UTILITY (m)	PERMANENT PROTECTION OF UTILITY?	LENGTH OF PERMANENT PROTECTION (m)	LENGTH OF ABANDONED (m)	COMMENT
C-0101	ARTC	COMMS	ENTIRE LENGTH	ARTC – LINE WIRE – SIGNALLING COMMS	Removed	N/A	N/A	N	N/A	TBD	N/A - No AS BUILT service removed
C-NWE0102	TELSTRA	COMMS	0.600	6 PAIR DIRECT BURIED CABLE	RELOCATED	1XP50 CONDUIT WITH 6 PAIR CABLE	150	N	N/A	150	NORTH WEST CONNECTION (PARKES BRANCH), COOPERS ROAD EXISTING UTILITY IS APPROX 750mm DEPTH FROM NATURAL SURFACE AT RAIL CROSSING. EXISTING UTILITY DOES NOT ACHIEVE MIN. 900mm UNDER PROPOSED DRAIN (NORTH SIDE OF RAIL)
C-NWE0104	TELSTRA	COMMS	0.600	6 PAIR DIRECT BURIED CABLE	PROTECT DURING CULVERT CONSTRUCTION	N/A	N/A	N	N/A	N/A	POTENTIAL IMPACT WITH CULVERT CONSTRUCTION. COMMS IN CLOSE PROXIMITY TO DRAINAGE STRUCTURE
C-NWE0105	TELSTRA	COMMS	0.600	6 PAIR DIRECT BURIED CABLE	CLASH WITH RAIL SIGNALLING CABLE	N/A	N/A	N	N/A	N/A	POTENTIAL IMPACT WITH RAIL SIGNALLING CABLE. SIGNALLING CABLE APPROX 400mm DEPTH. RELOCATED TELSTRA PROVIDED WITH SUFFICIENT DEPTH UNDER RAIL SIGNALLING CABLE
C-NW0201	TELSTRA	COMMS	1.300	30 PAIR DIRECT BURIED CABLE	RELOCATED	1XP50 CONDUIT WITH 30 PAIR CABLE	455	N	N/A	440	NORTH WEST CONNECTION (MAIN BRANCH) EXISTING UTILITY IS 600mm DEPTH FROM NATURAL SURFACE AT RAIL CROSSING. EXISTING UTILITY DOES NOT ACHIEVE MIN. 1.6m UNDER UPGRADED RAIL. IN ADDITION, PLACEMENT OF STRUCTURAL FILL WOULD IMPACT WITH EXISTING. FURTHERMORE, TELSTRA PREFERENCE IS TO REALIGN ALONG BROLGAN ROAD. POTENTIAL CONFLICT WITH CULVERT CONSTRUCTION 20m WEST OF RAIL CENTRELINE. CONDUIT INSTALLED APPROX 1.6m BELOW CULVERT. 1.6m OF STRUCTURAL FILL IS PROPOSED TO BE PLACED UNDER THIS CULVERT. UTILITY IS TO BE LOCATED ON SITE PRIOR TO CULVERT CONSTRUCTION. IF STRUCTURAL FILL IS REQUIRED TO BE PLACED BENEATH CONDUIT, UTILITY IS TO BE PROTECTED AS PER TYPE 4 DETAIL ON 3-0001-240-PUP-00-DR-2201.
C-NW0202	TELSTRA	COMMS	1.300	30 PAIR DIRECT BURIED CABLE	CLASH WITH RAIL SIGNALLING CABLE	N/A	N/A	N	N/A	N/A	POTENTIAL IMPACT WITH RAIL SIGNALLING CABLE. SIGNALLING CABLE APPROX 400mm DEPTH. RELOCATED TELSTRA PROVIDED WITH SUFFICIENT DEPTH UNDER RAIL SIGNALLING CABLE
C-NW0301	TELSTRA	COMMS	1.300	30 PAIR DIRECT BURIED CABLE	PROTECT DURING CONSTRUCTION. CLASH WITH RMAR	N/A	N/A	N	N/A	N/A	IMPACT WITH RMAR. PROTECT DURING CONSTRUCTION
C-0201	TELSTRA	COMMS	449.598	1XP50 CONDUIT WITH 10 PAIR CABLE	RELOCATED	1XP50 CONDUIT WITH 10 PAIR CABLE	90	N	N/A	90	PLEASE REFER TO 3-0000-240-PUP-TE-DR-0322 FOR AS BUILT LOCATION
C-0202	TELSTRA	COMMS	449.810	12 CORE OPTICAL FIBRE	PROTECT DURING FENCE/GATE CONSTRUCTION (IF REQUIRED)	N/A	N/A	N	N/A	N/A	UTILITY IN PROXIMITY TO FENCE/GATE CONSTRUCTION. UNDERGROUND UTILITY TO BE AVOIDED DURING CONSTRUCTION OF FENCE/GATE AND ASSOCIATED POSTS. IMPACT WITH OPTIC FIBRE ON EAST SIDE OF RAIL. REFER LX DRAWINGS FOR DETAIL
C-0206	TELSTRA	COMMS	449.810	2 PAIR CABLE (SIGNALLING CONNECTION)	Removed	N/A	N/A	N	N/A	43	SIGNALLING CONNECTION BETWEEN PIT AND HUT. SIGNALLING INFRASTRUCTURE TO BE UPGRADED AND THIS CABLE REMOVED. REFER WP&S DRAWINGS FOR SIGNALLING CABLE ALIGNMENT
C-0204	TELSTRA	COMMS	449.858	1XP100 CONDUIT WITH 12 CORE OPTICAL FIBRE, 30 PAIR CABLE AND 2x 2 PAIR CABLE	SERVICE UNDERBORED BY ARTC	N/A	N/A	Y	15	N/A	LX 1077 – BROLGAN ROAD 449.792. DESIGN VEHICLE 35m MODULAR B-TRIPLE EXISTING UTILITY IS APPROX 1m DEPTH FROM NATURAL SURFACE AT RAIL CROSSING. WILL BE APPROX 1.7-1.8m BELOW RAIL FOLLOWING UPGRADE WORKS. TOP OF CONDUIT AT APPROX 320.6m (AHD) UNDER RAIL. BOTTOM OF 150mm THICK CONCRETE SLAB TO BE PROVIDED AT 320.76m (AHD). BEDDING SAND PROVIDED BETWEEN CONDUIT AND BOTTOM OF SLAB. REFER TO DRAWING 3-0001-240-PUP-00-DR-2201, PROTECTION DETAIL TYPE 4 FOR DETAILS
C-0205	TELSTRA	COMMS	449.858	12 CORE OPTICAL FIBRE	PROTECT DURING FENCE/GATE CONSTRUCTION (IF REQUIRED)	N/A	N/A	N	N/A	N/A	PLEASE REFER TO 3-0000-240-PUP-TE-DR-0322 FOR AS BUILT LOCATION
C-0207	TELSTRA	COMMS	449.858	12 CORE OPTICAL FIBRE	CLASH WITH RAIL SIGNALLING CABLE	N/A	N/A	N	N/A	N/A	POTENTIAL IMPACT WITH RAIL SIGNALLING CABLE. SIGNALLING CONDUIT TO BE LOCALLY SHALLOWER WHEN PASSING OVER OPTICAL FIBRE. OPTICAL FIBRE APPROX 850mm DEPTH. SIGNALLING CONDUIT TO BE MAX 600mm DEPTH
C-0601	TELSTRA	COMMS	452.430	1XP100 CONDUIT WITH 2 PAIR AND 20 PAIR CABLE	PLEASE REFER TO 3-0000-240-PUP-TE-DR-0322FOR AS BUILT LOCATION APPLIES TO C0201 - C0207 PERMANENT PROTECTION	N/A	N/A	Y	56	N/A	LX 1078 – HENRY PARKES WAY (452.53). DESIGN VEHICLE 35m AB TRIPLE. EXISTING UTILITY IS APPROX 1m DEPTH FROM NATURAL SURFACE AT RAIL CROSSING. WILL BE APPROX 1.7-1.9m BELOW RAIL FOLLOWING UPGRADE WORKS. TYPE 3 PROTECTION SLAB UNDER THE RAIL FORMATION AND TYPE 4 PROTECTION SLAB ELSEWHERE. TOP OF CONDUIT AT APPROX 301.9m (AHD) UNDER RAIL. BOTTOM OF 150mm THICK CONCRETE SLAB TO BE PROVIDED AT 301.96m (AHD). BEDDING SAND PROVIDED BETWEEN CONDUIT AND BOTTOM OF SLAB. REFER TO DRAWING 3-0001-240-PUP-00-DR-2201 FOR DETAILS UTILITY IN PROXIMITY TO FENCE/GATE CONSTRUCTION. UNDERGROUND UTILITY TO BE AVOIDED DURING CONSTRUCTION OF FENCE/GATE AND ASSOCIATED POSTS. REFER LX DRAWINGS FOR DETAIL PER SITE INVESTIGATION RESULTS, CABLE IS 400mm BELOW NATURAL SURFACE IN PROXIMITY TO PROPOSED CULVERT LOCATION. CULVERT INLET PROPOSED 5.5m NORTH OF CABLE ALIGNMENT (WEST SIDE OF LX). CULVERT INLET PROPOSED 3.5m NORTH OF CABLE ALIGNMENT (EAST SIDE OF LX) COORDINATION REQUIRED FOR CONSTRUCTION OF CONCRETE PROTECTION AND RAIL SIGNALLING CABLE. SIGNALLING HUT AND SLAB TO BE REMOVED PRIOR TO CONSTRUCTION OF SLAB
C-0602	TELSTRA	COMMS	452.430	1XP100 CONDUIT WITH 2 PAIR AND 20 PAIR CABLE	PERMANENT PROTECTION. CLASH WITH RMAR	N/A	N/A	Y	SEE ABOVE	N/A	EXISTING DIRECT BURIED CABLE CLASHES WITH RMAR. EXTEND PERMANENT PROTECTION FROM C-0602 TO UNDER THE RMAR. TOE OF EMBANKMENT 4.5m FROM CENTRE OF PIT. THIS IS CONSIDERED SUFFICIENT
C-0603	TELSTRA	COMMS	452.430	DIRECT BURIED 2 PAIR AND 20 PAIR CABLE	SERVICE UNDERBORED BY ARTC	N/A	N/A	Y	6	N/A	IMPACT WITH CULVERT CONSTRUCTION ON WEST SIDE OF LX (APPROX 65m WEST OF RAIL CENTRELINE) CULVERT SCOUR PROTECTION ENCROACHMENT OVER CABLES EXISTING 20 AND 6 PAIR CABLES 1m FROM EXISTING SURFACE AT THIS LOCATION. FOLLOWING CONSTRUCTION OF SCOUR PROTECTION AND ASSOCIATED EARTHWORKS, APPROX 600mm COVER WILL REMAIN. PARALLEL CRITICAL 2 PAIR CABLE IS AT UNKNOWN DEPTH. ALL CABLES TO BE PROTECTED PERMANENTLY USING TYPE 4 DETAIL ON 3-0001-240-PUP-00-DR-2201

NOTES
1. FOR GENERAL NOTES REFER TO DRAWINGS FROM 3-0001-240-PEN-00-DR-0101
2. FOR UTILITY IMPACT LOCATIONS REFER TO THE WORKING PLAN AND SECTION DRAWINGS FROM 3-0001-240-CAL-00-DR-0101

DISCLAIMER

AS-BUILT

Drawing standard in accordance with EGP-04-01 & EGP-04-02

Rev	Date	Revision Description	Designed	Checked	Ind. Rev.	Approved	Accepted
2	04.06.21	AS-BUILT					
1	29.03.19	C-NW0201, C-0603 PROTECTION DETAILS UPDATED - ISSUED FOR CONSTRUCTION			BG	DF	JW
0	08.10.18	ISSUED FOR CONSTRUCTION	TD	BK	RM	DF	

Filename: 3-0001-240-PUP-00-DR-1101

Designed: T.DEMPSEY 08.10.18
Checked: B.KARKI 08.10.18
Ind.Rev. Company: IRDJV — Ind.Rev. Name: R.MACKAY
Ind.Review Signature: R.MACKAY 08.10.18
Approved By: D.FOLDI 08.10.18
Accepted By: J.WALSH 11.04.19

InlandRail PKS-NMN-R1101 — Sheet No. 1 OF 7 — Sheet size A1

PARKES TO NARROMINE
PUBLIC UTILITIES PLANT
COMMUNICATION IMPACT SCHEDULE SHEET 1

11. LANDSCAPE TREATMENT PLAN