Drawing Numbers and Titles

Design Standard

DOCUMENT HIERARCHY

This document resides within the Planning component of Western Power's Asset Management System (AMS).

DOCUMENT DATE

This document was last updated November 2024

IMPLEMENTATION DATE

This document came into service February 2024

DOCUMENT CONTROL

Record of endorsement, approval, stakeholders, and notification list is provided in EDM# 42624040 appendix

RESPONSIBILITIES

Western Power's Engineering & Design Function is responsible for this document

CONTACT

Western Power welcomes your comments, questions, and feedback on this document, which can be emailed to standards.excellence@westernpower.com.au

DISCLAIMER

COPYRIGHT

Contents

Revision Details

Version	Date	Summary of change
4	01/08/2022	Notification list updated. Section 1.2 Definition updated. Section 3.5 updated. Table B.1 Drawing Groups added. Table B.2 Drawing types added. Table 4.2 added.
5	February 2024	Standards Online Update
6	November 2024	Updated Table A.1 to add SS1/45/ and SS1/46/

1 Introduction

This Design Standard outlines the system for assigning drawing numbers and drawing titles. It includes the titles to be used on all drawings produced by Western Power and contractors for all transmission projects.

This drawing numbering system must be utilised across legacy sites for new secondary drawings when possible. The civil, structural, and primary allocation must be used for new substations and can be applied, to a certain extent, in brownfield substations.

1.1 Purpose and scope

This document applies to all substation transmission drawings at both terminal yards and zone substations. This system applies to transmission substation drawings only.

1.2 Acronyms

Acronym	Definition

1.3 Definitions

Term	Definition
Cancelled drawing	A drawing which has been made redundant or not required due to removal of the equipment to which it refers.
Circuit specific drawings	Are associated with one circuit. These can be derived from template drawings or site-specific standard drawings.
Computer aided engineering (CAE) packages	For example ePlan or Promise
Multi circuit drawings	Are associated with more than one circuit.
Not Maintained drawing	A drawing where a decision has been made to not revise the drawing and to keep it aligned with the actual installed plant (except where noted on the drawing). The equipment to which it refers may or may not be installed.
Not to be used for new designs	Legacy standard drawings that may use equipment, materials or installation methods that are out-dated or not part of the current standard. These drawings provide information on existing installations. They shall not be issued for construction in new designs (greenfield and brownfield)
Redrawn drawing	A drawing which has been completely re-drawn but retains the same drawing number as the original drawing.
Revised drawing	A drawing where the content in the drawing has been altered since the last formal issue.
Site specific drawings	Drawings produced from template drawings and belong to or are associated with a specific Western Power site.

Site specific manufacturer drawings	Tender related manufacturer drawings made site specific by modifying the location in slot 1. These drawing can be modified for site specific requirements. These drawings must reference the circuits they relate to.
Site specific standard drawing	Standard drawings made site specific by modifying the location in slot 1. These drawing can be modified for site specific requirements.
Standard drawings	These are approved for construction drawings that can be used across multiple applications. Tender related Manufacturer drawings are included with standard drawings.
Superseded drawing	A drawing where the information on it has been transferred to a more recent drawing with a different drawing number. Reference to the original drawing numbers needs to be made on the new drawing. Old drawing must be redirected to the new drawing.
Template drawings	A Template drawing is a guide that provides the fundamental principle on which site-specific drawings should be developed. These drawings follow the same numbering format as site specific drawings.
Tender related manufacturer drawings	Standard SS1 drawings created from the manufacturer drawings

1.4 References

2 Supporting Documentation[1]

3 Compliance

This Design Standard complies with all higher-level Western Power technical documents and relevant Australian Standards.

This Design Standard should encompass all requirements of the relevant Australian Standards which are current at the time of issue. A period will be set when the standard needs to be reviewed. If significant changes occur on an Australian Standard which affects safety, then an out of cycle review can be completed.

4 Functional Requirements

This Engineering Design Instruction is intended to be used by Substation Engineering staff and by companies completing outsourced design work for Western Power, as it outlines the Western Power requirements pertaining to the drawing numbers and titles for Transmission Substations.

[1] See Western Power Internal Document

5 Safety in Design

The Safety in Design (SiD) process shall be adhered to when creating new drawings. Any potential risks that may cause harm, affect the operation and maintenance of assets, or impact the environment or construction activities shall be identified during the design stages.

All projects are required to have a SiD Hazard Management Register (HMR) and these risks be registered in the HMR and eliminated or minimised so far as reasonably practicable (SFAIRP).

6 Drawing Numbering System

The general format of the Western Power drawing numbering sequence follows a slot numbering system. Each slot is given a defined value and is separated by a divide symbol (/). A five slot system is used for:

1. Standard drawings
2. Site specific standard drawings
3. Tender and specification drawings refer
4. Tender related manufacturer drawings
5. Site specific manufacturer drawing
6. Site specific manufacturer drawing variations

A four-slot system is used for templates and site-specific drawings.

6.1 Design Disciplines

Each of the design disciplines has a unique code defined below:

Table 2.1: Design discipline codes

Discipline	Unique
Substations / Automation	SS
Lines	T
SCADA	TTS8
Communication	C

6.2 Pre-defined Drawing Numbers

Each Western Power has pre-defined some of the information in many drawing numbers. This should be followed for all new sites and whenever possible for existing sites. A list of these numbers can be found in the following appendices:

1. Standard drawings slots 1, 2 & 3 – Appendix A.1.1
2. Civil drawings slot 2 and the drawing number – Appendix A.1.2
3. Structural drawings slot 2 and the drawing number – Appendix A.1.3
4. Primary drawing slot 2 and the drawing number – Appendix A.1.4

6.3 Superseding Existing Drawings

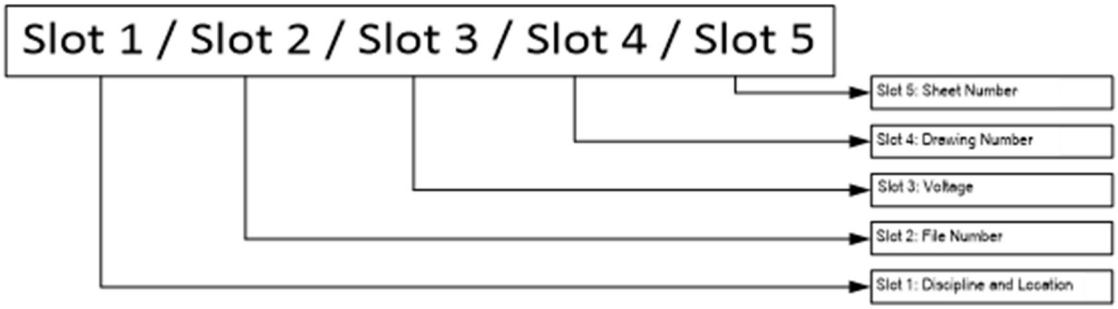
A new drawing must follow the drawing numbering system outlined in this document where possible. When an existing drawing is superseded, references in other drawings must be updated to reference the new drawing. The 'Superseded' drawing must be issued to Western Power, Engineering and Design, Document Control in order for the drawing management database to be updated.

6.4 Cancelling Drawings

When an existing drawing is cancelled, the drawing is to be marked 'Cancelled' and dated accordingly. The 'Cancelled' drawing must be issued to Western Power, Engineering and Design, Document Control in order for the drawing management database to be updated.

6.5 Standard Drawings

Drawing numbers for standard drawings are comprised of 5 slots. The information contained within each slot will vary depending on the type of standard drawing. The slots are generally described below.



The current set of Standard drawings are 600 series drawing numbers and are defined by slot 4.

6.5.1 Standard Drawings

6.5.1.1 Slot 1

The discipline and location for substations standard drawings is SS1.

6.5.1.2 Slot 2

Slot 2 contains a reference number associated with the type of equipment (Appendix A.1.1).

6.5.1.3 Slot 3

Slot 3 contains the equipment voltage reference (Appendix A.2.2). Where a slot 2 file number does not have an associated voltage, this can be a sequential number.

6.5.1.4 Slot 4

Slot 4 contains a 600 series number.

6.5.1.5 Slot 5

Slot 5 is the sheet number.

6.5.1.6 Examples

- Surge arrester support plate

  SS1/19/8/601/1

  - Slot 1 = SS1 identifies a standard drawing
  - Slot 2 = 19 identifies a structure fabrication drawing
  - Slot 3 = 8 identifies the voltage as 132 kV
  - Slot 4 = 601 identifies the standard drawing in the structure fabrication series
  - Slot 5 = 1 identifies the first sheet

6.5.2 Site Specific Standard Drawing[2]

Site specific standard drawings are copies of Western Power standard drawings applied to a specific site. The drawing numbering is identical to the Western Power standard drawing with the exception of the location. Site specific standard drawing locations are derived from the Transmission Substations File Index.

6.5.2.1 Example

- Security arrangement for Rangeway Substation

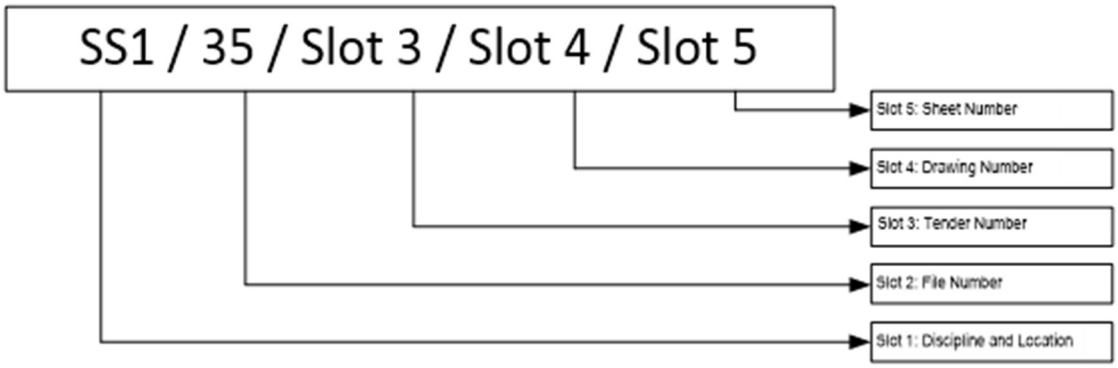
  SS37/42/0/600/1-5

  - Slot 1 = SS37 for Rangeway substation
  - Slot 2 = 42 (Appendix A.1.1)
  - Slot 3 = 0 (Appendix A.2.2)
  - Slot 4 = 600 because it is the first drawing in the standard drawing series of security drawings.
  - Slot 5 = 1-5 because there are 5 sheets in the set

6.5.3 Tender and Specification Drawing

A tender submission or specification drawing number will be in the following format:

[2] See Western Power Internal Document



6.5.3.1 Slot 1

The discipline and location for substations standard drawings is SS1.

6.5.3.2 Slot 2

Slot 2 is 35 (TENDER SUBMISSIONS Drawings Appendix A.1.1).

6.5.3.3 Slot 3

Slot 3 contains the tender number.

6.5.3.4 Slot 4

Slot 4 contains a sequential drawing number.

6.5.3.5 Slot 5

Slot 5 contains the sheet number.

6.5.3.6 Example

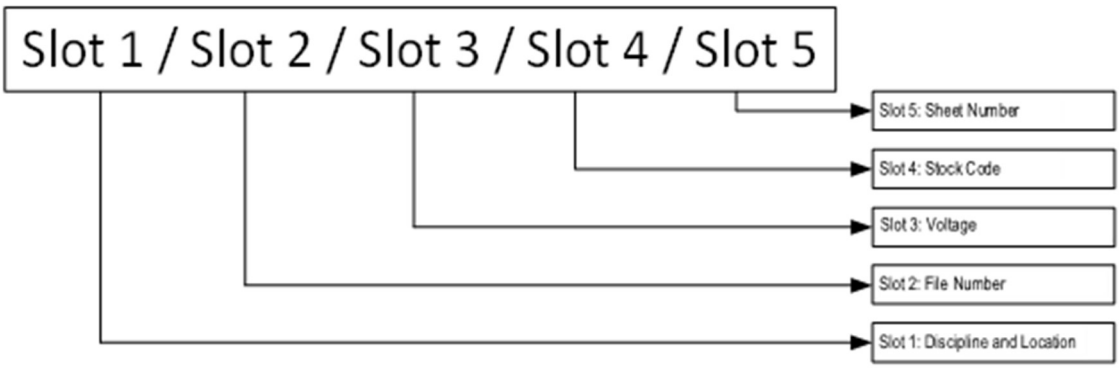
- 22 kV LV switchboard feeder circuit breaker

  SS1/35/1234/5678/1-…

  - Slot 1 = SS1 because it is a standard drawing
  - Slot 2 = 35 because it is a tender drawing
  - Slot 3 = 1234 which is the tender number
  - Slot 4 = 5678 which is the drawing number
  - Slot 5 = 1 – … which is the number of sheets in the set.

6.6 Manufacturer Drawings

6.6.1 Standard Manufacturer Drawing



6.6.1.1 Slot 1

The discipline and location for substations standard drawings is SS1.

6.6.1.2 Slot 2

Slots 2 refer to the type of equipment (Appendix A.1.1).

6.6.1.3 Slot 3

Slot 3 refers to the voltage level (Appendix A.1.1) .

6.6.1.4 Slot 4

Prior to 2017 this was a sequential number. From 2017 onwards, this number is associated with the stock code.

6.6.1.5 Slot 5

Slot 5 is the sheet number.

6.6.1.6 Examples

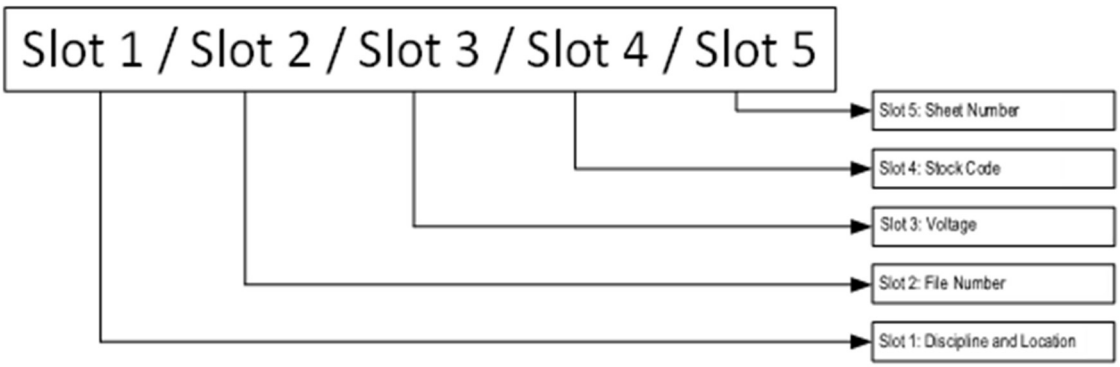
- 11 kV LV switchboard feeder circuit breaker

  SS1/33/3/1761/1-24

  - Slot 1 = SS1 because it is a standard drawing
  - Slot 2 = 33 because it is a part of a metal clad switchgear
  - Slot 3 = 3 because it is a 11 kV circuit breaker
  - Slot 4 = 1761 because the stock code is XA1761
  - Slot 5 = 1 – 24 because there are 24 sheets in the set

6.6.2 Site Specific Manufacturer Drawing

Site specific manufacturer are created to allow variation from the standard manufacturer drawings.



6.6.2.1 Slot 1

The discipline is SS and the location is found in the Transmission Substations File Index

6.6.2.2 Slot 2

Slots 2 refer to the type of equipment (Appendix A.1.1)

6.6.2.3 Slot 3

Slots 3 refer to the voltage level (Appendix A.1.1)

6.6.2.4 Slot 4

Slot 4 is derived from the stock code

6.6.2.5 Slot 5

Slot 5 is the sheet number.

6.6.2.6 Examples

- Rangeway 11 kV switchboard feeder

  SS37/33/3/1764/1-24

  - Slot 1 = the location (Rangeway substation)
  - Slot 2 = 33 because it is a part of a metalclad switchgear
  - Slot 3 = 3 because it is 11 kV
  - Slot 4 = 1761 because the stock code is XA1761
  - Slot 5 = 1 – 24 because there are 24 sheets in the set

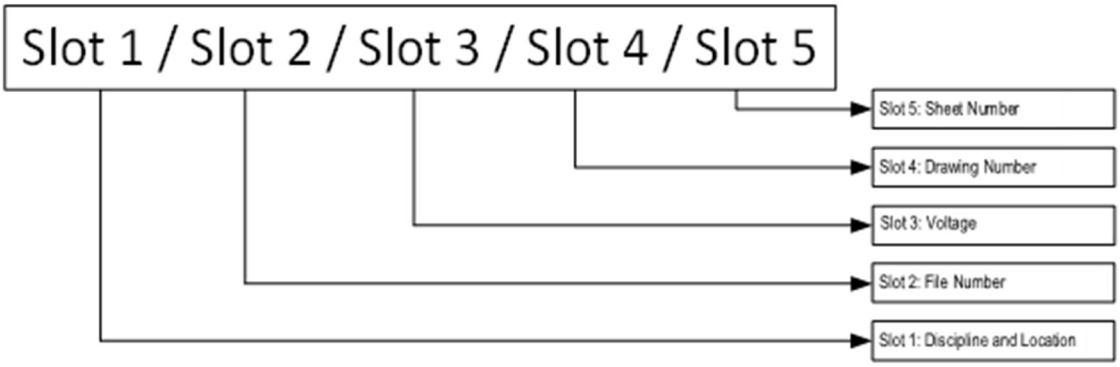
6.6.3 Circuit Specific Manufacturer Drawing Variation

Variations from tender related manufacturer drawings may result from:

- Site specific conditions
- Replacing a faulty component with a similar component from a different manufacturer.

When a variation to a drawing is required:

- A circuit specific drawing is created from the relevant site-specific manufacturer drawing. The circuit specific drawing number replaces the stock code in slot 4.
- Referencing on existing drawings to the site-specific manufacturer drawings must be changed to reference the new circuit specific drawing (e.g. circuit breaker schematics referencing the site specific manufacturer drawings must be revised to reference the circuit specific drawings).
- A note on the relevant site-specific manufacturer drawing must be added to indicate that a separate circuit specific drawing exists.



6.6.3.1 Slot 1[3]

The discipline is SS and the location is found in the Transmission Substations File Index.

6.6.3.2 Slot 2

Slots 2 refers to the type of equipment (Appendix A.1.1)

6.6.3.3 Slot 3

Slots 3 refers to the voltage level found in (Appendix A.1.1)

6.6.3.4 Slot 4

- Circuit Specific Drawing

  Slot 4 for circuit specific drawings is compose of:

  - A two, three or four digit scheme or circuit reference number (Appendix A.4.1).
  - A two digit drawing type reference number (Appendix A.4.2.1 for panel layouts, plate details and material lists, Appendix A.4.2.2 for schematics, Appendix A.4.2.3 for terminations).

- Multiple Circuit Drawings

[3] See Western Power Internal Document

Slot 4 for multiple circuit drawings consists of:

- A system voltage reference number (Appendix A.2.3)
- A three digit number composed of the battery number and a sequential number (e.g. 101, 102, 201, 201, etc).

6.6.3.5 Slot 5

Slot 5 is the sheet number or numbers.

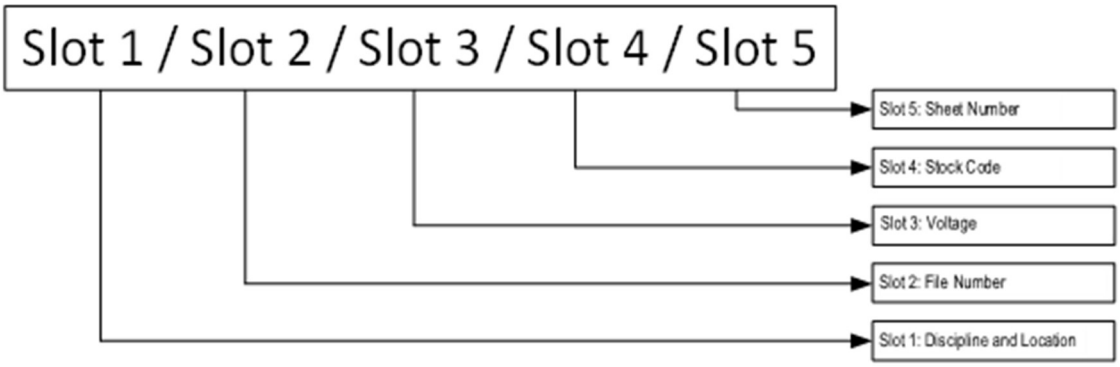
6.6.3.6 Examples

If a new drawing is required for a site-specific variation on the 341 feeder circuit breaker schematic the new drawing number would be:

SS37/33/3/341/1-24

- Slot 1 = the location (Rangeway substation)
- Slot 2 = 33 because it is a part of a metalclad switchgear
- Slot 3 = 3 because it is 11 kV
- Slot 4 = 341 because it is related to the 341 circuit
- Slot 5 = 1-24 worksheets

6.6.4 Predefined Manufacturer Drawing Numbers for Transformers



6.6.4.1 Slot 1

The discipline and location for substations standard drawings is SS1.

6.6.4.2 Slot 2

Slots 2 = 10
This is a fixed value, see Power Transformers (Appendix A.1.1)

6.6.4.3 Slot 3

Slot 3 refers to the voltage level of the transformer, see Power Transformers (Appendix A.1.1)

6.6.4.4 Slot 4

Prior to 2017 this was a sequential number. From 2017 onwards, this number is associated with the stock code.

6.6.4.5 Slot 5

Slot 5 is the sheet number; sheet numbers are defined as follows.

Table 6.2 Design discipline codes

General Arrangement drawing including Foundation details, transport arrangements etc.	Sheets 1 to 20
Rating Plate and Valve location plate	Sheets 21 to 24
Control, Schematic and Termination Drawings (including Tap Changers)	Sheets 25 to ~

6.6.4.6 Examples

- 33MVA 132/22kV YNd11 Transformer, Stock No. XA5107

  SS1/10/8/5107/1-24

  - Slot 1 = SS1 because it is a standard drawing
  - Slot 2 = 33 because it is a part of a Power Transformers.
  - Slot 3 = 8 because it is a 132kV Transformer.
  - Slot 4 = 5107 because the stock code is XA5107
  - Slot 5 = 1 – 24 because there are 24 sheets in the set If a new drawing is required for a site-specific variation on the 341 feeder circuit breaker schematic the new drawing number would be:

6.7 Template Drawings

Template drawings follow the site-specific drawing numbering convention with the location specified as a template.

- SSTZ1 is the current set of Civil, Structural, Primary and Secondary Zone Substation Templates which act as a guide to provide the fundamental principle on which site-specific drawings should be developed, they follow the site-specific drawing numbering convention with the location specified as a template.

  i.e.

  SSTZ1/3/1/1 - Template Substation 132kV – Switchyard – Arrangement – Electrical Layout

- SSTT1 is the current set of Civil, Structural, Primary and Secondary Terminal Templates which act as a guide to provide the fundamental principle on which site-specific drawings should be developed, they follow the site-specific drawing numbering convention with the location specified as a template.

  i.e.

  SSTT1/3/1/1 - Template Terminal 132kV – Switchyard – Arrangement – Electrical Layout

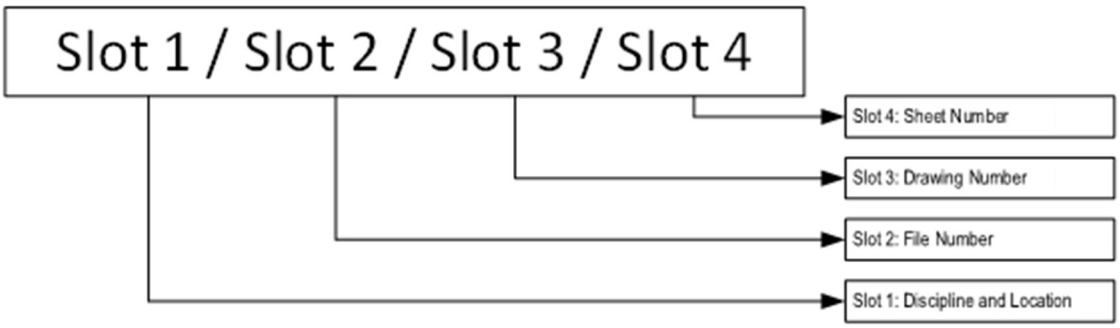
SSTT1/13/1/1 - Template Terminal 330kV – Switchyard – Arrangement – Electrical Layout

Should future sets of Civil, Structural, Primary and Secondary Templates be required SSTZ1 and SSTT1 will increment by 1, e.g. SSTZ2, SSTZ3 and so on so forth.

Table 6.3. Legacy Templates

Slot 1	Description	Status
SSYYY	Original zone substation templates, drafted using MicroStation V7	Obsolete
SSYYV	DNP zone substation templates, primary and secondary equipment are not current. MicroStation V8 version of SSYYY	Reference Only
SSTTT	Original terminal yard templates, drafted using MicroStation V7	Obsolete
SSTTV	DNP terminal yard templates, primary and secondary equipment are not current. MicroStation V8 version of SSTTT	Reference Only
SSABC	IEC61850 zone substation templates created for the 2012 tender, primary and secondary equipment are not current.	Reference Only
SSAAA	IEC61850 zone substation templates created for the 2016 tender, secondary relay equipment is not current.	Reference Only

6.8 Site Specific Drawings



6.8.1 Civil Drawings

6.8.1.1 Slot 1[4]

The discipline is SS and the location is found in the Transmission Substations File Index.

[4] See Western Power Internal Document

6.8.1.2 Slot 2

6.8.1.3 Slot 3

6.8.1.4 Slot 4

6.8.1.5 Examples

- Medical Centre site works, drainage layout:

  SS380/1/3/3

  - Slot 1 = SS380 which identifies the drawings as substations (SS) and the location as Medical Centre (380)
  - Slot 2 = 1 identifies the voltage as 132kV (blank) and the drawing category as civil.
  - Slot 3 = 3 identifies the drawing as a site works – clearing, drainage or earth works
  - Slot 4 = 3 identifies the sheet.

- Three Springs Terminal earthworks & drainage layout:

  SS350/11/3/1

  - Slot 1 = SS350 which identifies the drawings as substations (SS) and the location as Three Springs (350)
  - Slot 2 = 11 identifies the voltage as 330kV and the drawing category as civil.
  - Slot 3 = 3 identifies the drawing as a site works – clearing, drainage or earth works
  - Slot 4 = 1 identifies the sheet.

6.8.2 Structural Drawings

6.8.2.1 Slot 1[5]

The discipline is SS and the location is found in the Transmission Substations File Index.

6.8.2.2 Slot 2

Each substation or terminal yard is allocated 9 file numbers per voltage level, with 10 a universal number across all sites. The 10 series number is allocated for site utilisation drawings and utilisation planning drawings for all.
The file number for substation site specific drawings is composed of the file voltage reference (Appendix A.2.2.1) and category (Appendix A.2.1). For structural drawings the category is '2'.

6.8.2.3 Slot 3

Slot 3 is the drawing number (Appendix A.1.3).

[5] See Western Power Internal Document

6.8.2.4 Slot 4

Slot 4 is the sheet number

6.8.2.5 Examples

- Medical Centre structure layout:

  SS380/2/1/1

  - Slot 1 = SS380 which identifies the drawings as substations (SS) and the location as Medical Centre (380)
  - Slot 2 = 2 identifies the voltage as 132kV (blank) and the drawing category as Structural
  - Slot 3 = 1 identifies the drawing as a layout
  - Slot 4 = 1 identifies the sheet.

- Three Springs terminal structure layout

  SS350/12/1/1

  - Slot 1 = SS350 which identifies the drawings as substations (SS) and the location as Three Springs Terminal (350)
  - Slot 2 = 12 identifies the category as a 330 kV structural drawing
  - Slot 3 = 1 identifies the drawing as a layout
  - Slot 4 = 1 identifies the sheet.

6.8.3 Primary Drawings

6.8.3.1 Slot 1[6]

The discipline is SS and the location is found in the Transmission Substations File Index.

6.8.3.2 Slot 2

Each substation or terminal yard is allocated 9 file numbers per voltage level, with 10 a universal number across all sites. The 10 series number is allocated for site utilisation drawings and utilisation planning drawings for all.
The file number for substation site specific drawings is composed of the file voltage reference (Appendix A.2.2.1) and category (Appendix A.2.1). For primary drawings the category is '3'.

6.8.3.3 Slot 3

Slot 3 is the drawing number (Appendix A.1.4).

[6] See Western Power Internal Document

6.8.3.4 Slot 4

Slot 4 is the sheet number

6.8.3.5 Examples

- Medical Centre primary elevation:
  SS380/3/2/1
  - Slot 1 = SS380 which identifies the drawings as substations (SS) and the location as Medical Centre (380)
  - Slot 2 = 3 identifies the voltage as 132kV (blank) and the drawing category as Primary
  - Slot 3 = 2 identifies the drawing as an elevation
  - Slot 4 = 1 identifies the sheet number

- Three Springs Terminal primary elevation:
  SS350/13/2/1
  - Slot 1 = SS350 which identifies the drawings as substations (SS) and the location as Three Springs (350)
  - Slot 2 = 13 identifies the voltage as 330kV and the drawing category as Primary
  - Slot 3 = 2 identifies the drawing as an elevation
  - Slot 4 = 1 identifies the sheet number

6.8.4 Secondary Drawings

6.8.4.1 Slot 1[7]

The discipline is SS and the location is found in the Transmission Substations File Index.

6.8.4.2 Slot 2

Each substation or terminal yard is allocated 9 file numbers per voltage level, with 10 a universal number across all sites. The 10 series number is allocated for site utilisation drawings and utilisation planning drawings for all.
The file number for substation site specific drawings is composed of the file voltage reference (Appendix A.2.2.1) and category (Appendix A.2.1)

6.8.4.3 Slot 3

- Circuit Specific Drawing

  Slot 3 for circuit specific drawings is composed of:

  - A two, three or four digit scheme or circuit reference number (Appendix A.4.1) and
  - A two digit drawing type reference number (Appendix A.4.2.1 for arrangements, plate details and material lists, Appendix A.4.2.2 for schematics and Appendix A.4.2.3 for terminations).

- Multiple Circuit Drawings

  Slot 3 for multiple circuit drawings consists of:

[7] See Western Power Internal Document

- A system voltage reference number (Appendix A.2.3) and
- A three digit number composed of the battery number and a sequential number (e.g. 101, 102, 201, 201, etc)

6.8.4.4 Slot 4

Slot 4 is the sheet number

6.8.4.5 Examples

- Rangeway transformer 2 AC drawing (circuit specific):
  SS37/5/80500/1
  - Slot 1 = SS37 which identifies the drawings as substations (SS) and the location as Rangeway (37)
  - Slot 2 = 5 identifies the voltage as 132 kV (blank) and the drawing as a schematic (5)
  - Slot 3 = 80500 identifies the circuit as 805 and the drawing type as an AC drawing (00)
  - Slot 4 = 1 identifies it as sheet 1

- 2016 tender 22 kV cubicle 1 arrangement template (multiple circuits):
  SSAAA/4/500101/1
  - Slot 1 = SSAAA which identifies it as a substation 2016 tender template
  - Slot 2 = 4 which identifies it as an arrangement, plate detail or material list
  - Slot 3 = 500101 which identifies it as the arrangement for the 22 kV multi circuit (500) battery 1 first cubicle (101)
  - Slot 4 = 1 identifies it as sheet 1

- Three Springs Terminal Bay 3 AC Drawing (circuit specific):
  SS350/15/93000/1
  - Slot 1 = SS350 which identifies the drawings as substations (SS) and the location as Three Springs (350)
  - Slot 2 = 15 identifies the voltage as 330kV and the drawing category as a schematic (5)
  - Slot 3 = 93000 identifies the circuit as 930 and the drawing type as an AC drawing (00)
  - Slot 4 = 1 identifies the sheet number

6.9 Site Specific Drawings

Reference files may only be used where written approval is obtained from Western Power or its authorised representative.

6.9.1 Slot 1[8]

The discipline is SS and the location is found in the Transmission Substations File Index.

6.9.2 Slot 2

For site specific substation reference file drawings, the file voltage reference number is general. (Appendix A.2.2.1)

[8] See Western Power Internal Document

6.9.3 Slot 3

Slot 3 is based on the type of discipline specific reference file being created, the naming convention and drawing title must not deviate from the names listed in Appendix D, unless written approval is obtained from Western Power or its authorised representative.

6.9.4 Example

- Template Zone Substation Base File:

  SSTZ1/0/BASE

  - Slot 1 = SSTZ1 which identifies the drawings as substations (SS) and the location as Template Zone Substation
  - Slot 2 = 0 which identifies it as general.
  - Slot 3 = BASE which identifies it as being the BASE reference file.

- Template Zone Substation Primary Reference File:

  SSTZ1/0/PRIMARY

  - Slot 1 = SSTZ1 which identifies the drawings as substations (SS) and the location as Template Zone Substation
  - Slot 2 = 0 which identifies it as general.
  - Slot 3 = PRIMARY which identifies it as being the PRIMARY reference file.

6.10 Concept Drawings

Concept drawings use a unique 5 Slot sequence.

6.10.1 Slot 1

The first slot (Prefix) in the drawing number sequence 'C' denotes that the drawing is a Concept drawing.

6.10.2 Slot 2[9]

The location is found in the Transmission Substations File Index.

6.10.3 Slot 3

Each substation or terminal yard is allocated 9 file numbers per voltage level, with 10 a universal number across all sites. The 10 series number is allocated for site utilisation drawings and utilisation planning drawings for all.
The file number for substation site specific drawings is composed of the file voltage reference (Appendix A.2.2.1) and category (Appendix A.2.1). For primary drawings the category is '3'.

[9] See Western Power Internal Document

6.10.4 Slot 4

Slot 4 is the drawing number (Appendix A.1.4)

6.10.5 Slot 5

Slot 4 is the sheet number

6.10.6 Examples

- Waikiki Substation Concept Drawings for Primary drawings category.

  C/SSWAI/3/1/1

  - Slot 1 = C because it is a Concept Drawing
  - Slot 2 = WAI which identifies the drawings as substations (SS) and the location as Waikiki Substation
  - Slot 3 = 3 identifies the voltage as 132kV (blank) and the drawing category as Primary
  - Slot 4 = 1 which is the first drawing number available and increments thereafter.
  - Slot 5 = 1 identifies the sheet number

6.11 Preliminary Drawings

Concept drawings use a unique 5 Slot sequence.

6.11.1 Slot 1

The first slot (Prefix) in the drawing number sequence 'P' denotes that the drawing is a Preliminary drawing.

6.11.2 Slot 2[10]

The location is found in the Transmission Substations File Index.

6.11.3 Slot 3

Each substation or terminal yard is allocated 9 file numbers per voltage level, with 10 a universal number across all sites. The 10 series number is allocated for site utilisation drawings and utilisation planning drawings for all.
The file number for substation site specific drawings is composed of the file voltage reference (Appendix A.2.2.1) and category (Appendix A.2.1). For primary drawings the category is '3'.

6.11.4 Slot 4

Slot 4 is the drawing number (Appendix A.1.4)

6.11.5 Slot 5

Slot 5 is the drawing number.

[10] See Western Power Internal Document

6.11.6 Slot 4

- Waikiki Substation Preliminary Drawings for Primary drawings category.

  P/SSWAI/3/1/1

  - Slot 1 = P because it is a Preliminary Drawing
  - Slot 2 = WAI which identifies the drawings as substations (SS) and the location as Waikiki Substation
  - Slot 3 = 3 identifies the voltage as 132kV (blank) and the drawing category as Primary
  - Slot 4 = 1 which is the first drawing number available and increments thereafter.
  - Slot 5 = 1 identifies the sheet number

6.12 Contingency Drawings

Concept drawings use a unique 5 Slot sequence.

6.12.1 Slot 1

The first slot (Prefix) in the drawing number sequence 'CONT' denotes that the drawing is a Contingency drawing.

6.12.2 Slot 2[11]

The location is found in the Transmission Substations File Index.

6.12.3 Slot 3

Each substation or terminal yard is allocated 9 file numbers per voltage level, with 10 a universal number across all sites. The 10 series number is allocated for site utilisation drawings and utilisation planning drawings for all.
The file number for substation site specific drawings is composed of the file voltage reference (Appendix A.2.2.1) and category (Appendix A.2.1). For primary drawings the category is '3'.

6.12.4 Slot 4

Slot 4 is the drawing number (Appendix A.1.4)

6.12.5 Slot 5

Slot 5 is the drawing number.

6.12.6 Examples

- Waikiki Substation Preliminary Drawings for Primary Discipline
  CONT/SSWAI/3/1/1
  - Slot 1 = CONT because it is a Contingency Drawing
  - Slot 2 = WAI which identifies the drawings as substations (SS) and the location as Waikiki Substation

[11] See Western Power Internal Document

- Slot 3 = 3 identifies the voltage as 132kV (blank) and the drawing category as Primary
- Slot 4 = 1 which is the first drawing number available and increments thereafter.
- Slot 5 = 1 identifies the sheet number

6.13 External Web Published Standards & Template Drawings

External Web Published Standard & Template drawings use a unique 5 Slot sequence.

6.13.1 Slot 1

The first slot (Prefix) in the drawing number sequence 'WP' denotes that the drawing is an External Web Published Standards & Template Drawings.

6.13.2 Slot 2[12]

The location is found in the Transmission Substations File Index.

6.13.3 Slot 3

Each substation or terminal yard is allocated 9 file numbers per voltage level, with 10 a universal number across all sites. The 10 series number is allocated for site utilisation drawings and utilisation planning drawings for all.
The file number for substation site specific drawings is composed of the file voltage reference (Appendix A.2.2.1) and category (Appendix A.2.1). For primary drawings the category is '3'.

6.13.4 Slot 4

Slot 4 is the drawing number (Appendix A.1.4)

6.13.5 Slot 5

Slot 5 is the sheet number.

6.13.6 Examples

- External web published standard drawing

  WP/SS1/22/8/600/1

  - Slot 1 = WP because it is an externally web published Standard Drawing.
  - Slot 2 = SS1 because it is a standard drawing
  - Slot 3 = 22 because it is an Outdoor Electrical Assembly.
  - Slot 4 = 8 because it is a 132kV Current Transformer
  - Slot 5 = 600 is the assigned drawing number
  - Slot 6 = 1 identifies the sheet number

[12] See Western Power Internal Document

7 CAD File Naming Convention

7.1 CAD File Types

There are two types of CAD files in Western Power's CAD system:

- Raster files are legacy drawings that have been scanned and are a '.cit' file type. Raster files are referenced into an associated vector file. Any required revisions can then be made in the vector file.
- Vector files are our current MicroStation file type and are a '.dgn' file type.

Raster and vector files have the same CAD file name with the exception of the file type (.cit or .dgn).

Raster files must be correctly referenced into the associated vector file before checking into Western Power's CAD system.

7.2 CAD File Number

7.2.1 Current CAD File Numbering

The CAD file number is to reflect the drawing number. The 'ss' in the CAD file number is to be lower case. Leading zeros (0's) are to be used, as per the examples below. Lower case staging letters are included in the CAD file number.

Examples:

Drawing Number	CAD File Number
SS1/24/8/22/1	ss001-24-8-022-001.dgn & .cit
SS10/4/A/117/1	ss010-04-a-117-001.dgn & .cit
SS123/5/80300/1	ss123-05-80300-001.dgn & .cit

7.2.2 Legacy CAD File Numbering[13]

Legacy drawings may contain CAD file numbers which utilise an alphanumerical code to reduce three digit integers to two. This was necessary when space for the integer was limited and is no longer required or used.

The following outlines this legacy system:

7.2.2.1 SS1 Drawings

SS1 is replaced by 'z'.

- The voltage reference in slot 3 is copied as a single character.
- The remaining integers are written as double integers (e.g. 01, not 1).

[13] See Western Power Internal Document

- Where the number in slots 2, 4 or 5 exceeds 99, the alphanumeric character substituted.

7.2.2.1.1 Examples:

Drawing Number	CAD File Number
SS1/24/8/22/1	z2482201.dgn
SS1/22/5/110/13	z225df13.dgn

7.2.2.2 Site Specific Drawings

- CAD file text is lower case
- SS is abbreviated to ‘s’. This letter will be the 1st digit in file name.
- The remaining 8 digits represent four, two-digit numeric fields related to the drawing number. The staging letter, generally ‘A’, is not be included in the file name.
- Where the drawing number has integers of 3 digits, an alphanumerical code is used to reduce the 3 digits to 2. The chart in Appendix C is used for the conversion.

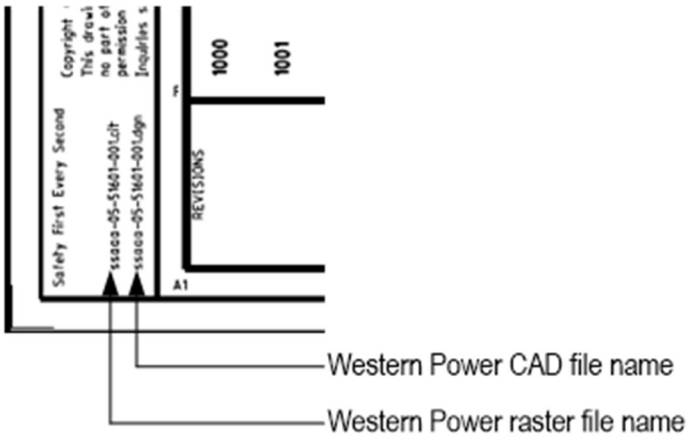
7.2.2.2.1 Examples:

Drawing Number	CAD File Number
SS179/9/A/1/1	sfw090101.dgn
SS4/14/A/25/1	s04142501.dgn
SS22/196/1	s22gn01.dgn

7.3 CAD File Name Drawing Location

The WPC CAD file names are located in the bottom left-hand corner of the border cell, new drawings must be produced using Templates, Seed Files or Border Cells with the tag set ‘pw_pwtb’ attached.

Legacy drawings contain border cells using ‘Data Fields’ the WPC CAD file name in shown in the bottom left-hand corner of the border cell.



7.4 Populating Data fields (Legacy Drawings)

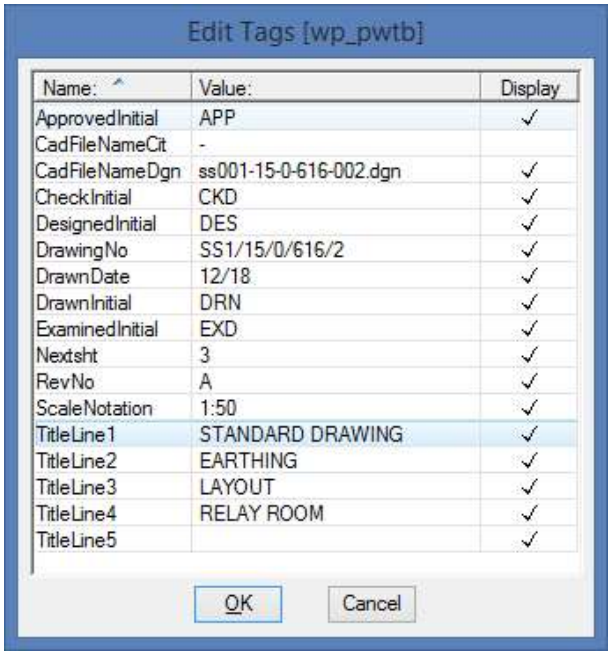
This section has been kept for historical purposes only, there should be no real need for updating borders with data fields as all new drawings produced should use Templates, Seed Files or Border Cells with the tag set ‘pw_pwtb’ attached, however should editing be required for legacy drawings see procedure below.

The Data field on the drawing can be filled in by clicking the Fill In Single Enter-Data Field button. This will then require you to type in the CAD file name. This will result in the CAD file name appearing in the correct spot (left hand corner side) on the drawing.

7.5 Populating Tags

The Tag Set (wp_pwtb) is attached to the border cell. Tags can be updated using the ‘Edit Tags’ tool, either by selecting the tag(s) itself or by selecting the element to which the tag(s) is attached.

Populate and display all relevant fields within the Western Power, Project Wise, Title Block Tag Set (wp_pwtb) this enables the attribute exchange within Project Wise to extract title block meta data into the data source.

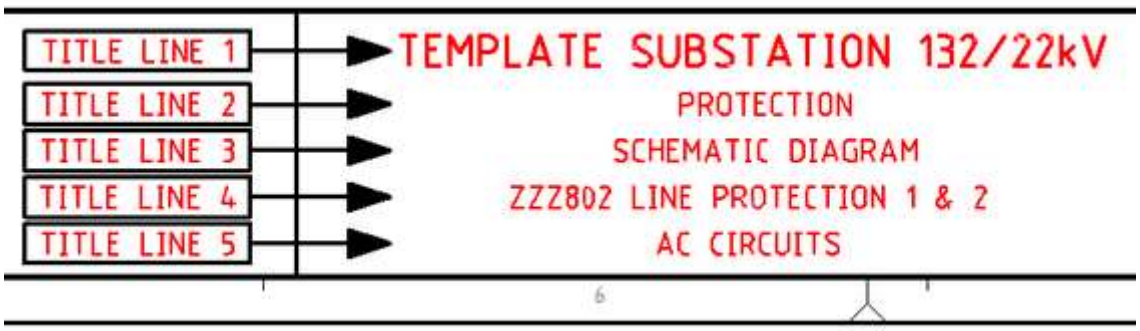


8 Drawing Titles

8.1 Format

The basic title formats for particular projects shall be determined by prior agreement with Western Power.

The preferred format for ‘SS’ drawings (Substations) is:



Approved abbreviations are permitted within the title block information (Appendix C).

8.1.1 Line 1 Location and Voltage Level

8.1.1.1 Location

The first part of the title shall define the drawing as a:

- Geographical location. The official record of locations and the SSxxx/ numbers associated with them will be found in the Transmission Substations File Index. The names listed therein are to be strictly adhered to, thus drawings will be titled 'Northern Terminal' not 'Northern Terminal Switching Station' and 'Kwinana Terminal' not 'Kwinana Power Station'. The relevant voltage level shall follow the location.
- Standard drawing. All drawings in the SS1/ series other than manufacturers' drawings shall have the first part of the title as 'Standard Drawing' followed by a primary system voltage level if applicable.
- Specification or tender (include the specification or tender number). The first part of the drawing shall be Manufacturer's name followed by a primary voltage level if applicable.

8.1.1.2 Voltage Level

When required the primary system voltages to be used are: 330kV, 220kV, 132kV, 66kV, 33kV, 22kV, 11kV, 6.6kV.

Where a drawing encompasses more than one voltage level either:

- The highest relevant voltage shall be used or
- Both voltages may be used separated by a slash (e.g.132/11kV).

8.1.1.2.1 Zone Substations

Zone substations shall be labelled with the substation name and both voltages, separated by a slash.

i.e. Medical Centre Substation 132/11kV

8.1.1.2.2 Terminals Yards

Terminals shall be labelled with the terminal name and the voltage of that yard.

i.e. Yandin Terminal 330kV

Where a terminal has two yards for two separate voltages, the drawings for each yard shall have the terminal name and the voltage of that yard

i.e. NORTHERN TERMINAL 330kV and NORTHERN TERMINAL 132kV

Terminal yards with multiple voltages in the same yard shall be labelled with the highest relevant voltage.

i.e. 22kV equipment at Three Springs Terminal shall be labelled

THREE SPRINGS TERMINAL 330kV

8.1.2 Line 2 General Grouping

The second part of the title shall be one of a number of standard equipment types or switchyard areas, to be known as 'groupings' (Appendix B.1).

8.1.3 Line 3 Drawing Types

The third part of the title shall be one of a number of standard types (Appendix B.2).

8.1.4 Lines 4 & 5 Drawing Description

The fourth part of the drawing shall describe the area, item of plant or other information covered by the drawing. It should include identification by circuit number, bay number or any other information to fully describe the applicability of the drawings. The layout of the line should follow circuit number, voltage, circuit type and description. The description may be 1 or 2 lines. Line 5 should indicate when a drawing is a site-specific standard drawing or site-specific manufacturer drawing.

8.1.5 Example:

A trip coil is replaced with an equivalent from a different manufacturer. The standard manufacturer drawing set is copied as a site specific

Line 1	RANGEWAY SUBSTATION 132 / 11 kV
Line 2	CIRCUIT BREAKER
Line 3	SCHEMATIC DIAGRAM
Line 4	345 BUS SECTION
Line 5	SITE SPECIFIC MANUFACTURER DRAWING

Note that in this case the site-specific drawing numbers would be:

SS37/33/3/1764/1-10

8.2 Manufacturer Drawing

Table 8.1: Manufacture drawing title

Line	Description
1	Manufacturer name, voltage, type of plant
2	Manufacturer type
3	Specification, item, stock code, contract if applicable
4 & 5	Drawing type / description

8.2.1 Examples

- Areva 24kV Circuit Breaker
- Type GL108X
- Specification SO-P0055-04 Item 01H Stock Code XA1243
- Schematic Diagram
- Control and Monitoring

8.3 Abbreviations

Abbreviations can only be used on the fourth and fifth line of a title.

Full stops and number prefixes are not to be used. As an example, C.B. and Tx No 1 are incorrect. CB and T1 are correct.

Refer to Appendix D for a list of acceptable drawing title abbreviations.

8.4 Drawing Title Text Format

Drawing title text is uppercase.

Table 8.2: Drawing title text format

Drawing Line	Drawing Size	Text Height (mm)
Line 1	A0 to A2	5
	A3 to A4	3.5
Line 2	A0 to A3	3.5
	A4	2.5
Line 3	A0 to A3	3.5
	A4	2.5
Line 4 & 5	A0 to A3	3.5
	A4	2.5

Appendix A: Drawing Numbering System References

A.1 Predefined Drawing Number Slots

A.1.1 Standard Drawings Slots 1, 2 & 3

Table A.1: Standard drawing slots 1, 2 & 3

Slots 1, 2 & 3	Title
SS1/1	DISCONNECTORS
SS1/1/3	Disconnectors (11kV)
SS1/1/5	Disconnectors (22kV)
SS1/1/6	Disconnectors (33kV)
SS1/1/7	Disconnectors (66kV)
SS1/1/8	Disconnectors (132kV)
SS1/1/X	Disconnectors (220kV)
SS1/1/9	Disconnectors (330kV)
SS1/2	CIRCUIT BREAKERS
SS1/2/3	Circuit Breakers (11kV)
SS1/2/5	Circuit Breakers (22kV)
SS1/2/6	Circuit Breakers (33kV)
SS1/2/7	Circuit Breakers (66kV)
SS1/2/8	Circuit Breakers (132kV)
SS1/2/X	Circuit Breakers (220kV)
SS1/2/9	Circuit Breakers (330kV)
SS1/3	CURRENT TRANSFORMERS
SS1/3/3	Current Transformers (11kV)
SS1/3/5	Current Transformers (22kV)
SS1/3/6	Current Transformers (33kV)
SS1/3/7	Current Transformers (66kV)
SS1/3/8	Current Transformers (132kV)
SS1/3/X	Current Transformers (220kV)
SS1/3/9	Current Transformers (330kV)
SS1/4	VOLTAGE TRANSFORMERS
SS1/4/6	Voltage Transformers (33kV)
SS1/4/7	Voltage Transformers (66kV)

SS1/4/8	Voltage Transformers (132kV)
SS1/4/X	Voltage Transformers (220kV)
SS1/4/9	Voltage Transformers (330kV)
SS1/5	SURGE ARRESTERS
SS1/5/6	Surge Arresters (33kV)
SS1/5/7	Surge Arresters (66kV)
SS1/5/8	Surge Arresters (132kV)
SS1/5/X	Surge Arresters (220kV)
SS1/5/9	Surge Arresters (330kV)
SS1/6	WAVE TRAPS & COUPLING CAPACITORS
SS1/6/8	Wave Traps & Coupling Capacitors (132kV)
SS1/6/X	Wave Traps & Coupling Capacitors (220kV)
SS1/6/9	Wave Traps & Coupling Capacitors (330kV)
SS1/7	INSULATORS
SS1/7/5	Insulators (22kV)
SS1/7/6	Insulators (33kV)
SS1/7/7	Insulators (66kV)
SS1/7/8	Insulators (132kV)
SS1/7/X	Insulators (220kV)
SS1/7/9	Insulators (330kV)
SS1/8	CONDUCTOR HARDWARE & CONNECTION DETAILS
SS1/8/0	Conductor Hardware & Connection Details (General)
SS1/8/5	Conductor Hardware & Connection Details (22kV)
SS1/8/6	Conductor Hardware & Connection Details (33kV)
SS1/8/7	Conductor Hardware & Connection Details (66kV)
SS1/8/8	Conductor Hardware & Connection Details (132kV)
SS1/8/9	Conductor Hardware & Connection Details (330kV)
SS1/9	TELEMETERING
SS1/9/0	Telemetering Components (General)
SS1/9/1	Neutralising Transformers

SS1/10	POWER TRANSFORMERS
SS1/10/6	Power Transformers (33kV Primary)
SS1/10/8	Power Transformers (132kV Primary)
SS1/10/X	Power Transformers (220kV Primary)
SS1/10/9	Power Transformers (330kV Primary)
SS1/11	EQUIPMENT ENCLOSURES FOR USE IN SWITCHYARDS
SS1/11/0	Equipment Enclosures for use in Switchyards (General)
SS1/12	CAPACITOR BANKS
SS1/12/2	Capacitor Banks (6.6kV)
SS1/12/3	Capacitor Banks (11kV)
SS1/12/5	Capacitor Banks (22kV)
SS1/12/6	Capacitor Banks (33kV)
SS1/12/7	Capacitor Banks (66kV)
SS1/13	EARTHING COMPENSATORS & REACTORS
SS1/13/3	Earthing Compensators & Reactors (11kV)
SS1/13/5	Earthing Compensators & Reactors (22kV)
SS1/13/6	Earthing Compensators & Reactors (33kV)
SS1/13/8	Earthing Compensators & Reactors (132 kV)
SS1/13/X	Earthing Compensators & Reactors (220kV)
SS1/13/9	Earthing Compensators & Reactors (330kV)
SS1/14	EQUIPMENT FOR USE IN RELAY BUILDINGS & CONTROL ROOMS
SS1/14/0	General – Labels
SS1/14/1	Protection Cubicles, Relay Racks and Panels
SS1/14/2	Mosaic Control Panels and Associated Equipment
SS1/14/3	Enclosures – Cubicles etc
SS1/14/4	Batteries and Associated Equipment
SS1/14/5	Rectifiers
SS1/14/6	Fire Protection
SS1/14/7	Air-conditioning for Switchrooms
SS1/14/8	Relay Room Equipment – General – Internal/External
SS1/15	EARTHING DETAILS

SS1/15/0	Earthing Details (General)
SS1/15/5	Earthing Details (22kV)
SS1/15/7	Earthing Details (66kV)
SS1/15/8	Earthing Details (132kV)
SS1/15/X	Earthing Details (220kV)
SS1/15/9	Earthing Details (330kV)
SS1/16	LIGHTNING AND SMALL POWER EQUIPMENT
SS1/16/0	Lightning and Small Power Equipment (General)
SS1/17	INSULATOR WASHING EQUIPMENT
SS1/17/0	Insulator Washing Equipment (General)
SS1/17/9	Insulator Washing Equipment (330kV)
SS1/18	FOUNDATIONS AND CIVIL STANDARDS
SS1/18/0	Foundations General (Includes Cable Trenches & Drainage)
SS1/18/3	Foundations (11kV)
SS1/18/5	Foundations (22kV)
SS1/18/6	Foundations (33kV)
SS1/18/7	Foundations (66kV)
SS1/18/8	Foundations (132kV)
SS1/18/9	Foundations (330kV)
SS1/19	STRUCTURE FABRICATION
SS1/19/0	Structure Fabrication (General)
SS1/19/3	Structure Fabrication (11kV)
SS1/19/5	Structure Fabrication (22kV)
SS1/19/6	Structure Fabrication (33kV)
SS1/19/7	Structure Fabrication (66kV)
SS1/19/8	Structure Fabrication (132kV)
SS1/19/9	Structure Fabrication (330kV)
SS1/20	STRUCTURE ASSEMBLIES
SS1/20/0	Structure Assemblies (General)
SS1/20/3	Structure Assemblies (11kV)
SS1/20/5	Structure Assemblies (22kV)

SS1/20/6	Structure Assemblies (33kV)
SS1/20/7	Structure Assemblies (66kV)
SS1/20/8	Structure Assemblies (132kV)
SS1/20/9	Structure Assemblies (330kV)
SS1/21	OUTDOOR ELECTRICAL FABRICATION
SS1/21/0	Electrical Fabrication (General)
SS1/21/3	Electrical Fabrication (11kV)
SS1/21/5	Electrical Fabrication (22kV)
SS1/21/6	Electrical Fabrication (33kV)
SS1/21/7	Electrical Fabrication (66kV)
SS1/21/8	Electrical Fabrication (132kV)
SS1/21/9	Electrical Fabrication (330kV)
SS1/22	OUTDOOR ELECTRICAL ASSEMBLIES
SS1/22/0	Electrical Assemblies (General)
SS1/22/3	Electrical Assemblies (11kV)
SS1/22/5	Electrical Assemblies (22kV)
SS1/22/6	Electrical Assemblies (33kV)
SS1/22/7	Electrical Assemblies (66kV)
SS1/22/8	Electrical Assemblies (132kV)
SS1/22/9	Electrical Assemblies (330kV)
SS1/23	RESISTOR BANKS
SS1/23/0	Resistor Banks (General)
SS1/23/3	Resistor Banks (11kV)
SS1/23/5	Resistor Banks (22kV)
SS1/23/6	Resistor Banks (33kV)
SS1/23/7	Resistor Banks (66kV)
SS1/23/8	Resistor Banks (132kV)
SS1/23/9	Resistor Banks (330kV)
SS1/24	CABLE SEALING ENDS
SS1/24/0	Cable Sealing Ends (General)
SS1/24/3	Cable Sealing Ends (11kV)
SS1/24/5	Cable Sealing Ends (22kV)
SS1/24/6	Cable Sealing Ends (33kV)

SS1/24/7	Cable Sealing Ends (66kV)
SS1/24/8	Cable Sealing Ends (132kV)
SS1/24/9	Cable Sealing Ends (330kV)
SS1/25	METERING UNITS
SS1/25/6	Metering (33kV)
SS1/26	FAULT THROWERS
SS1/26/8	Fault Throwers (132kV)
SS1/27	WALL BUSHING
SS1/27/8	Wall Bushing (132kV)
SS1/28	EARTH SWITCHES
SS1/28/0	Earth Switches (General)
SS1/28/5	Earth Switches (22kV)
SS1/28/7	Earth Switches (66kV)
SS1/28/8	Earth Switches (132kV)
SS1/28/X	Earth Switches (220kV)
SS1/28/9	Earth Switches (330kV)
SS1/29	GAS INSULATED SWITCHGEAR
SS1/29/8	Gas Insulated Switchgear (132kV)
SS1/30	SUBSTATION STANDARDS
SS1/30/0	General (Miscellaneous)
SS1/30/1	Primary Equipment Labelling
SS1/31	SUBSTATION STANDARDS – REPORT, SPECS & PLANNING
SS1/31/0	General
SS1/32	PROTECTION STANDARD SCHEMES
SS1/32/0	General

SS1/33	METAL CLAD INDOOR SWITCHGEAR
SS1/33/3	Metal Clad Indoor Switchgear (11kV)
SS1/33/5	Metal Clad Indoor Switchgear (22kV)
SS1/33/6	Metal Clad Indoor Switchgear (33kV)
SS1/34	STANDARD DRAWING PROFORMAS
SS1/35	TENDER SUBMISSIONS Drawings
SS1/35/01	Karrup S/S
SS1/35/02	Jandakot S/S
SS1/35/03	International Minerals
SS1/36	TENDER SPECIFICATIONS Drawings
SS1/36/01	MV Indoor Metal-Clad Switchboards – Spec.#SO-P0098-03
SS1/37	CONTRACT SPECIFICATIONS Drawings
SS1/38/	MANUFACTURERS BUILDINGS
SS1/38/0	General (All Voltages)
SS1/38/5	Manufacturers Building (22kV)
SS1/38/7	Manufacturers Building (66kV)
SS1/38/8	Manufacturers Building (132kV)
SS1/38/X	Manufacturers Building (220kV)
SS1/38/9	Manufacturers Building (330kV)

SS1/39/	Rapid Response 81
SS1/40/	Rapid Response 82
SS1/41/	Miscellaneous
SS1/42/	Security
SS1/43/	Statcom
SS1/44	Automation
SS1/44/0	General
SS1/45/	RRST71 Mobile Substation
SS1/46/	Key Management System
SS1/47/	RRST72 Mobile Substation

A.1.2 Civil Drawing Number and Title Lines

Table A.2: Civil drawing number and title lines

Drawing Number	Line 2	Line 3	Line 4
1	General	Plan	Title Deed
2	Site Works	Plan	Topographical Survey
3	Site Works	Plan	Clearing, Drainage, Earth Works
4	Roads	Plan	Road Layout
5	Fences	Layout	Fences, Boundary Walls
6	Site Works	Plan	Site Surfacing
7	Landscaping	Plan	
8	Foundations	Layout	
9	Foundations	Layout	Transformer Bunds
10	Cable Trenches	Layout	
11	Cable Trenches	Layout	Cable Trench Covers

A.1.3 Structural Drawing Number and Title Lines

Table A.3: Structural drawing number and title lines

Drawing Number	Line 2	Line 3	Line 4	Line 5
1	Structures	Layout		
2	Structures	Schedule	Fabrication Schedule	

A.1.4 Primary Drawing Number and Title Lines

Table A.4: Primary drawing number and title lines

Drawing Number	Line 2	Line 3	Line 4
1	Switchyard	Arrangement	Electrical Layout
2	Switchyard	Arrangement	Electrical Equipment Elevations
3	Switchyard	Material List	Electrical Equipment Schedule
4	Earthing	Layout	
4 (Sheet 2)	Earthing	Material List	
5	Switchyard	Arrangement	Outdoor Labels Layout
5 (Sheet 2)	Switchyard	Material List	Outdoor Labels Schedule
6	Spare	Spare	Spare

7	Switchyard	Arrangement	Lightning Protection Layout
8	Switchyard	Arrangement	Lighting Layout
9	Switchyard	Arrangement	Underground Power Cables Layout
9 (Sheet 2)	Switchyard	Material List	Underground Power Cables Schedule
10	Switchyard	Arrangement	Dangerous Goods Layout
11	Switchyard	Arrangement	RRST 81 Layout
12	Switchyard	Arrangement	RRST 82 Layout
Sequential Hereafter			

For example, Busbar Details & Electrical Assemblies

13	Circuit Breakers	Electrical Assembly	(Manufacturer & Type)
14	Busbar	Detail	Flexible Laminate – 2500A

A.2 Slot References

A.2.1 Substation Drawing Categories

Table A.5: Substation drawing categories

Drawing Number	Category
1	Site plans, civil works, roads, fencing, landscaping and foundations (excluding building foundations)
2	Structures and buildings (includes building foundations)
3	Substation electrical arrangement and earthing drawings and details
4	Relay room equipment, layouts and material lists
5	Schematic diagrams, key diagrams
6	Termination and wiring diagrams
7	Fire protection and alarms
8	Cable schedules
9	ePlan or Promise drawings (CAE Package that combines 4,5,6 and 8 series information)
10	Site utilisation and Planning (all voltage levels)

A.2.2 Voltage Levels

A.2.2.1 File Number Voltage Reference

Table A.6: File Number Voltage Reference

File Voltage Reference	Voltage Level
0	General

Blank	132 & 66 kV
1	330 kV
2	33 kV, 22 kV, 11 kV, 6.6 kV
3	220 kV

If one yard with a single common relay room covers two voltages, then the highest voltage will determine the file number (e.g. 132 / 22 kV substation).

e.g. File Voltage Reference = X

SS123/X3/3/1

A.2.2.2 Equipment Voltage Reference

Table A.7: Equipment voltage reference

Equipment Voltage Reference	Voltage Level
0	General
3	11 kV
5	22 kV
6	33 kV
7	66 kV
8	132 kV
X	220 kV
9	330 kV

A.2.2.3 Multiple Circuit Voltage Reference

Table A.8: Multiple circuit voltage reference

Multiple Circuit Reference	Voltage Level
300	11 kV
500	22 kV
600	33 kV
700	66 kV
800	132 kV
X00	220 kV
900	330 kV

A.3 Site Specific Drawings

A.3.1 Scheme or Circuit Reference Numbers

Table A.9: Scheme or circuit reference numbers

Scheme or Circuit	Reference Number
Spare	00
Bus zone 1	10
Bus zone 2	20
Fault recorder	30
UVLS	40
415 Vac	50
110 Vdc	60
50 Vdc	70
SCADA / communications	80
General	90
801 circuit	801
9101 circuit	9101

A.4 Secondary Drawing Types

A.4.1 Panel Layouts, Plate Details and Material Lists

Table A.10: Single Circuit Protection Cubicle - Panel layout, plate detail and material list drawing types

Used primarily for Protection 1 & 2 residing in the same cubicle. (Segregated.) e.g. DNP

Type	Reference Number	Sheet
Arrangement	00	1
Plate detail – Prot. 1	01	1,2,…
Plate detail – Prot. 2	02	1,2,…
Material list	00	No sheet with Excel

Table A.11: Single Circuit Protection Cubicles - Panel layout, plate detail and material list drawing types

Used for Protection 1 & 2 residing in separate cubicles. (Typically, no more than two cubicles)

Type	Reference Number	Sheet
Arrangement – Prot. 1	01	1
Plate detail – Prot. 1	01	2, 3 …..
Material list – Prot. 1	01	No sheet with Excel
Arrangement – Prot. 2	02	1
Plate detail – Prot. 2	02	2, 3 …..

Material list – Prot. 2	02	No sheet with Excel

Table A.12: Multi Circuit Protection Cubicles – Panel layout, plate detail and material list drawing types

Used for Multiple circuits of the same protection in one cubicle. E.g. IEC61850

Type	Reference Number	Sheet
Arrangement – Prot. 1 - Cubicle 1	101	1
Plate detail – Prot. 1 - Cubicle 1	101	2, 3 …..
Material list – Prot. 1 - Cubicle 1	101	No sheet with Excel
Arrangement – Prot. 2 - Cubicle 1	201	1
Plate detail – Prot. 2 - Cubicle 1	201	2, 3 …..
Material list – Prot. 2 - Cubicle 1	201	No sheet with Excel

A.4.2 Schematic Drawing Types

Table A.13: Schematic drawing types

Type	Reference Number	Line Numbers
AC	00	0-999
DC Protection 1	01	1000-1999
DC Protection 2	02	2000-2999
Alarms/ indication / control	03	3000-3999
Spare	04	4000-4999
Auxiliary supplies	05	5000-5049
Motorised disconnector / earth switch interlocks	06	6000-6999
Spare	07	7000-7999
General	09	9000-9999
Circuit Specific Manufacturer Drawings		
Circuit breaker	30	N/A
Voltage transformer	31	
Current transformer	32	
Earthing transformer	33	
Power transformer	34	
Tap changer	35	
Surge Arrester	41	
Disconnector	44	
Disconnector with earth switch	45	
Earth switch	47	

LV switchboard 1	51	
LV switchboard 2	52	
LV switchboard 3	53	
LV switchboard 4	54	

A.4.3 Termination Drawing Types

Table A.14: Termination drawing types

Type of termination	Reference Number
Protection 1	01
Protection 2	02
CB mech box	03
Current transformer	04
Voltage transformer	05
Disconnector aux switch	06
Control cubicle	07
Bund valve test / isolation switch	08
Earthing transformer	09
Marshalling box (1.5 CB Yards)	10
Inter panel wiring	11
Spare	12
Spare	13
Tariff metering	14

Appendix B: Drawing Titles References

B.1 Predefined Drawing Number Slots

Table B.1: Drawing Groups

Drawing Group	Remarks
Alarm	Schematics
Automation	
Automation Cubicle	
Auxiliary Power Supplies	AC supplies & distribution
Building	
Busbars	Drawings associated with rigid Busbars
Cable Sealing End	
Cable Trays	
Cable Trenches	
Cabling	Schedules & accessories (including sealing ends)
Capacitor Banks	
Circuit Breakers	
Communications	Includes Pilot Wire Systems
Combined Current / Voltage Transformer	
Conductors	
Conduits	
Connectors	Includes terminal palms, adaptor plates & spacers
Control	Schematics
Control Panels	Mimic type
Coupling Capacitors	
Current Transformers	
DC Supplies	
Disconnector	
Disconnector & Earth Switch	
Earthworks	
Earthing	
Earthing Transformer	
Electrical	Restricted use only
Equipment Enclosures	Marshalling box, fuse box
Fences	
Field Cubicle	

Fire Protection	
Foundations	
General	Property details etc
Heat Exchanger	
Hybrid GIS	
Insulators	
Insulator Set Hardware	
Interconnecting Lines	
Interface Cubicle	
Labels	Schedules and details
Landscaping	
Lighting	
Lightning	
Line Traps	
Live Plant Washing	
Metering	
Power Transformers	
Protection	Schematics
Protection & Automation Cubicle	Arrangements & wiring diagrams
Protection Cubicle	Arrangements & wiring diagrams
Protection Rack	Arrangements & wiring diagrams
Reactors	
Roads	
Security	
Services	
Site Works	Earthworks, retaining walls, feature walls
Signal Flow Diagram	Interlocking Logic
Statcom	
Station Post Insulators	
Structures	
Substation	For drawings such as elevation and layout of bays
Supervisory	
Surge Arresters	
Suspension Insulator Set	
Switchyard	For drawings such as elevation and layout of bays
Switchboard	

Tension Insulator Set	
Voltage Transformers	
Transmission Line	

B.2 Drawing Types

Table B.2: Drawing Types

Drawing Type	Remark
Arrangement	Primary Plant, Panels, Racks, Cubicles
Assembly	Components
Concept	Planning Phase. e.g. Primary Layout
Demolition	Layout or Drawing indicating structures to be demolished.
Descriptive	Instructions, Specifications
Detail	Individual Components, Nameplates
Electrical Assembly	Equipment Erection Drawings
Elevation	Equipment, Switchyard Bay
Graphical	Stringing Charts, Bar Charts, Graphs
Fibre Connection Schedule	
Interconnection Diagram	Connections between Relay Racks
Intercubicle Wiring Diagram	Connections between Cubicles
Key Diagram	
Layout	Switchyard Bays, Lighting, Earthing etc
Material List	
Material List and Labels Schedule	
Network Diagram	PERT Programming
Plan	Equipment, Switchyard Bay
Preliminary	High Level design between Concept and Detailed Design.
Rating Diagram	
Schedule	Cable, Lock and Key etc
Schematic Diagram	
Signal Flow Diagram	Logic and Block Diagrams
Single Line Diagram	
Site Utilisation	
Termination Diagram	
Wiring Diagram/Tables	
Profile	Transmission Lines Routes

Route Plan	Transmission Lines
Interlocking	

Appendix C: Drawing Title Abbreviations

* Indicates the abbreviation is only to be used if the full name does not fit into the title box whilst maintaining CAD standards

** Circuit numbers for substations are to use the substation abbreviation, not the circuit abbreviation

(e.g. ST801 – correct, Southern Terminal CCT 801 - incorrect)

~ No abbreviation to be used

Number

Table C.1: Drawing title abbreviations

Full Name	DGN Drawing Title Abbreviation (4th and 5th line only)
Alarms	~
And	&
Auxiliary Circuit*	AUX CCT
Busbar*	BB 'X'
Bus Zone	BZ
Capacitor Bank*	CAP BANK
Centres	CRS
Circuit**	CCT
Circuit Breaker	CB
Combined Current/ Voltage Transformer	Combined CT/VT
Current Transformer	CT
Diameter	DIA / ø#
Disconnector*	
(Formerly isolator)	DIS
Disconnector with Earth switch	DES
Earthing Transformer	EC
Height	HT
Indication and Auxiliary Circuits	IND & AUX CIRCUITS
Length	LG
Marshalling Box*	MARSH BOX
Mechanical	MECH
Mechanism Box	MECH BOX
Metering Box*	M BOX
Number	No
Outside Diameter	OD

Overall	O/A
Power Voltage Transformer	POWER VT
Protection*	PROT
Reactor*	RE
Receive	Rx
Supervisory Termination Rack	STR
Surge Arrester	SA
Transformer #*	T# (ie: T2)
Transmit	Tx
Typical	TYP
Vacuum	VAC
Voltage Transformer	VT
Alternating Current	AC
Direct Current	DC

Appendix D: Drawing Title Abbreviations

*Title Line 1 refers to Line 1 Location and Voltage Level (4.1.1)

Should additional reference file names be required a *Logical Name must be used to identify the file and its content.

Table D.1: Microstation - Reference File Naming Convention

CAD File Name	Corp ID	Drawing Title
ssxxx-00-base.dgn	SSXXX/0/BASE	*TITLE LINE 1 – BASE -- REFERENCE FILE
ssxxx-00-civil-survey.dgn	SSXXX/0/CIVIL/SURVEY	*TITLE LINE 1 – CIVIL SURVEY -- REFERENCE FILE
ssxxx-00-civil-earthworks.dgn	SSXXX/0/CIVIL/EARTHWORKS	*TITLE LINE 1 – CIVIL EARTHWORKS -- REFERENCE FILE
ssxxx-00-civil-roads.dgn	SSXXX/0/CIVIL/ROADS	*TITLE LINE 1 – CIVIL ROADS -- REFERENCE FILE
ssxxx-00-civil-fencing.dgn	SSXXX/0/CIVIL/FENCING	*TITLE LINE 1 – CIVIL FENCING -- REFERENCE FILE
ssxxx-00-foundations.dgn	SSXXX/0/FOUNDATIONS	*TITLE LINE 1 – FOUNDATIONS -- REFERENCE FILE
ssxxx-00-strucures.dgn	SSXXX/0/STRUCTURES	*TITLE LINE 1 – STRUCTURES -- REFERENCE FILE
ssxxx-00-primary.dgn	SSXXX/0/PRIMARY	*TITLE LINE 1 – PRIMARY -- REFERENCE FILE
ssxxx-00-primary-belowground.dgn	SSXXX/0/PRIMARY/BELOWGROUND	*TITLE LINE 1 – PRIMARY -- BELOWGROUND -- REFERENCE FILE
ssxxx-00-aerial_image.ecw	SSXXX/0/AERIAL_IMAGE	*TITLE LINE 1 – AERIAL IMAGE -- REFERENCE FILE
ssxxx-00-***Logical name***.dgn	SSXXX/0/****LOGICAL NAME***	*TITLE LINE 1 – *LOGICAL NAME – REFERENCE FILE

Table D.2: AutoCAD Civil 3D -- Reference File Naming Convention

Should additional reference file names be required a ***Logical Name*** must be used to identify the file and its content.

CAD File Name	Corp ID	Drawing Title
ssxxx-00-civil-survey.dwg	SSXXX/0/CIVIL/SURVEY - AutoCAD	*TITLE LINE 1 – CIVIL -- SURVEY – C3D REFERENCE FILE
ssxxx-00-civil-earthworks.dwg	SSXXX/0/CIVIL/EARTHWORKS - AutoCAD	*TITLE LINE 1 – CIVIL -- EARTHWORKS – C3D REFERENCE FILE
ssxxx-00-civil-roads.dwg	SSXXX/0/CIVIL/ROADS - AutoCAD	*TITLE LINE 1 – CIVIL -- ROADS – C3D REFERENCE FILE
ssxxx-00-civil-design.dwg	SSXXX/0/CIVIL/DESIGN - AutoCAD	*TITLE LINE 1 – CIVIL -- DESIGN – C3D REFERENCE FILE
Ssxxx-00-***Logical name***.dwg	SSXXX/0/****LOGICAL NAME*** -- AutoCAD	*TITLE LINE 1 – *LOGICAL NAME – C3D REFERENCE FILE

Appendix E: Approval Record and Document Control[14]

[14] See Western Power Internal Document