



CS ENERGY PROCEDURE FOR
DRAWING MANAGEMENT
CS-AM-001

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1 Purpose

To establish and maintain a procedure for the management of all drawings registered and stored in CS Energy Document Management Centres.

2 Scope

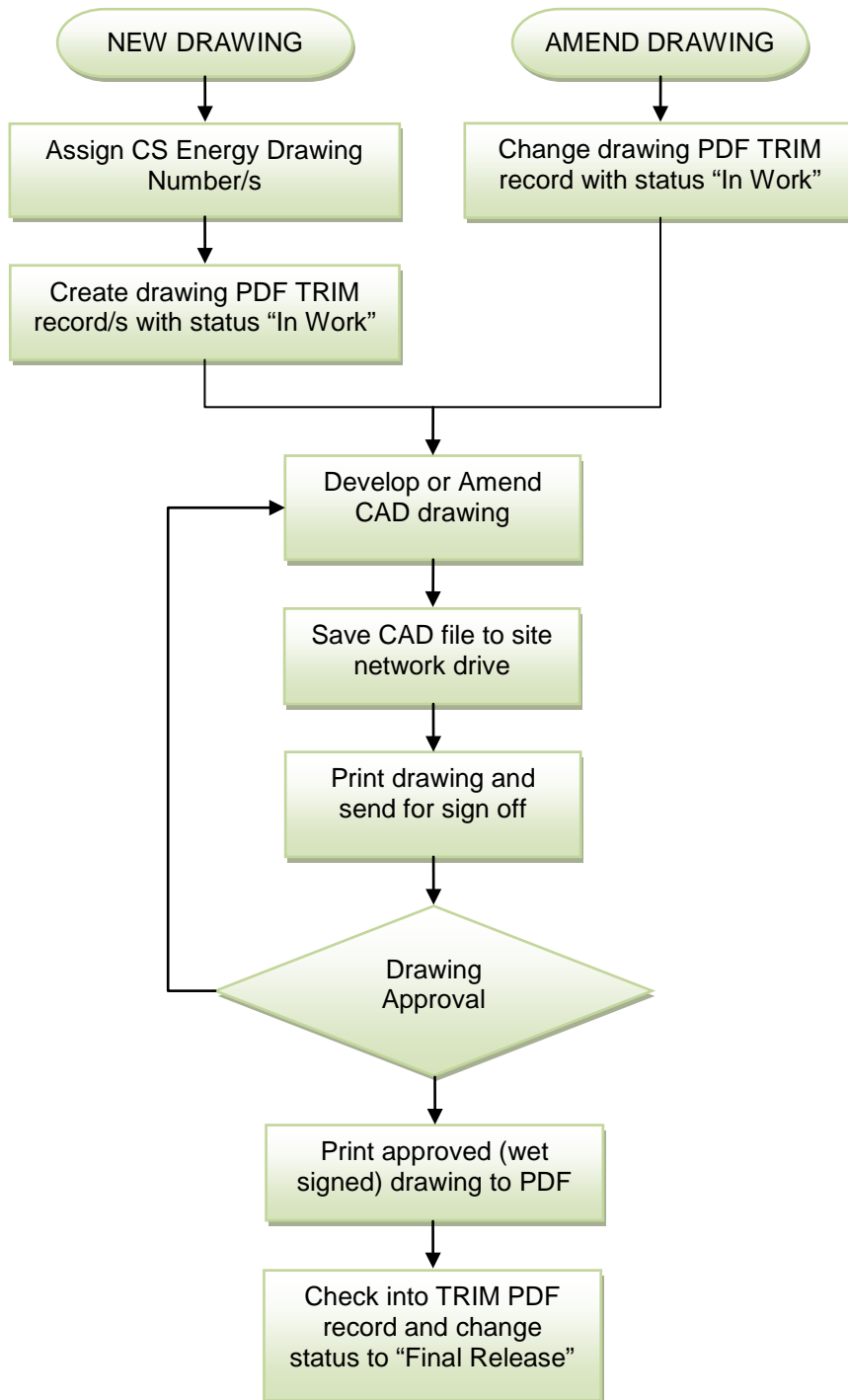
This procedure considers drawing management from creation through to archiving and / or obsolescence. It shall apply to all CS Energy new builds from Kogan Creek A Station onwards.

3 Deliverables

The deliverables of this procedure are:

- A consistent system of managing drawings across CSE sites
- Drawings that comply with Australian and CSE standards
- A searchable drawing system linked into SAP
- The assurance of accessing only the latest approved drawings.

4 Process Flow



5 Standards

5.1 Drawing Supply

All drawings whether drawn within CS Energy or by external contract, shall comply with the following requirements.

5.1.1 Drawing Standards

All drawings are to comply with the relevant Australian Standards, which as a minimum include; AS1000, AS1046, AS1100, AS1101, AS1102.

Metric drawings sizes of A0, A1, A2, A3 and A4 will be accepted. The choice of drawing size must be appropriate for the content and use of the drawing.

All drafted drawings shall use the standard CSE drawings borders (includes title block) which comply with the Australian standards.

Note: Refer to Appendix 2 for further details - CSE CAD Drawing Standard.

5.1.2 CAD Drawing Format

All drawings shall be supplied in AutoCAD format of the latest version.

In addition to the CAD file, a PDF file derived directly from the source file shall also be provided.

5.2 Drawing Registration / Control

All drawings shall be registered in TRIM and where required included in SAP's DMS (Document Management System) via the TRIM to SAP Interface.

As CAD drawing files require special viewing software, a PDF file shall be derived directly from the source file by the Drafting Officer or contractor. The PDF copies of the drawings shall be entered into TRIM and shall be the only record accessed by users.

The source files (CAD files) shall be stored on a site network drive. These source files shall be controlled and only be searched, viewed and accessed by the Drafting Officer / Document Management Officer (DMO).

In the event of updating the source drawings, the Drafting Officer / DMO shall update the PDF copy in TRIM with a new PDF (derived directly from the updated CAD file) and update the revision number accordingly. This will ensure only one (1) TRIM record exists for the life of the drawing and no duplicates are developed.

Where a duplicate drawing is entered into TRIM by error it will be repaired by the TRIM administrator. The TRIM administrator will only process drawing deletions where the drawing is confirmed as being obsolete.

The Drafting Officer / DMO must ensure that all known attributes are loaded accurately, completely and free of spelling and grammar mistakes into the TRIM PDF record metadata.

Where drawings are supplied, developed, amended as part of a development, project or modification it is the responsibility of the department / officer in charge of the work to ensure all drawings are registered onsite in compliance with this document and effectively transitioned and communicated to all site stakeholders.

The mandatory information to be recorded includes:

- Drawing Number (Contractor) If available - Refer to Section 5.2.3
- Drawing Number (CS Energy) - Refer to Section 5.2.3
- Drawing Revision - Refer to Section 5.2.5
- Drawing Title - Refer to Section 5.2.6
- Drawing Availability Status - Refer to Section 5.2.7
- Drawing Type - Refer to Section 5.2.8
- Drawing Storage Location - Refer to Section 5.2.9

5.2.1 Additional Registration Fields

In addition to the above mandatory fields, the following information is to be included in the registration where possible.

- Contractor name (If a drawing is supplied externally it is **mandatory** to record the **contractor name and drawing number** in TRIM)
- Previous drawing number(s) - Refer to Section 5.2.3
- Functional location Material Master reference number/s Refer to Section 5.2.6

5.2.2 TRIM to SAP Interface

TRIM has the ability to interface with SAP when registering records. This has the benefit of maintaining the essential DMS links in SAP to Functional Locations, Material Masters and PM Routines without manually maintaining parallel systems. The electronic file location is pointed back to TRIM to open the registered file. TRIM shall remain the primary document management system for drawing management.

Note the diagram in Section 8 shows the mapping of data between TRIM and SAP.

5.2.3 Drawing number

The contractors drawing number, previous drawing number or any other unique identification shall be recorded in the TRIM metadata where available. These numbers / identification may be essential as a reference to other drawings and manuals and therefore must be preserved.

The Drafting Officer / DMO shall manage the allocation of CSE drawing numbers with reference to TRIM. The Drafting Officer / DMO shall search TRIM to identify the next available number within each Plant Area Strategy. External and parallel drawing registers shall not exist outside of TRIM.

A block of drawing (AA) numbers may be allocated and registered in TRIM as PDF Place Holders during project / modification work. On completion of the project / modification all unused drawing numbers are to be released for reallocation.

A unique CSE drawing number shall be applied to all drawings, whether produced internally or externally. Drawings produced by vendors / contractors may have their own drawing number but must display in a CSE title block the CSE drawing number.

The drawing number comprises of three (3) Levels divided into five (5) parts. The breakdown of level 1 represents the Station Identification, level 2 represents the drawing asset group and drawing number, level 3 represents the sheet number and revision code. The three levels are divided by (-) a separator. The five parts are broken down into (a) Site Code, (b) Station Code, (c) Asset Group and Drawing Number, (d) Sheet Number, (e) Drawing Revision Code e.g. KA - 053456 - 006B

1		2	3	
(a)	(b)	(c)	(d)	(e)
K	A	053456	006	B
A	A	NNNNNN	NNN	A

Site Code

Station Code

Drawing Number

(6 Digit Number)

First 2 digits represent the plant asset area

Second 4 digits represent the drawing number

Sheet Number

(3 digit Number)

Drawing Revision Code

Part	Format	Example	Example description
Drawing Number	Site Code	A	K C Callide K Kogan W Wivenhoe
	Station Code	A	A A – A Station B – B Station C – C Station ...
	Separator	-	- Hyphen
	Drawing Set Number Refer to 5.2.4 Plant Area Strategies	NNNNNN	053456 010000 to 019999 – Fuel Supply Systems 020000 to 029999 – Fuel Process Systems 030000 to 039999 – Air and Gas Systems 040000 to 049999 – Boiler plant 050000 to 059999 – Dust Collection ...
	Separator	-	- Hyphen
	Sheet Number	NNN	006 Sheet number (001 – 999)
	Revision Code	A	B Sequential revision code

Where drawing amendment is required as a result of an error or plant modification, the modification officer shall inform the DMO of all required drawings to enable the DMO to change the drawing status to (IA) "In Work". On completion of modification work the amended drawing shall be approved, and saved as a new revision, the DMO will then change the status to (FR) "Final Release" and update the revision field in the TRIM metadata.

Where drawing development is required as a result of a plant modification, the modification officer shall inform the DMO of the quantities and plant areas to enable the DMO to assign drawing numbers and register TRIM placeholders.

Some modifications take a number of years to complete across multiple units of plant. In this circumstance drawings for the modified and unmodified plant are required to exist concurrently and therefore new drawing numbers will be assigned for the modified plant. On completion of modification work, the original drawing shall have its status changed to (OB**) "obsolete".

5.2.4 Drawing Number Range – Plant / Strategy Number – Plant Area Strategy

Drawing Number Range	Kog	Cal	Wiv	Plant
010000 – 019999	(01)	[01]	{W01}	Fuel Supply Systems
020000 – 029999	(02)	[02]	{W02}	Fuel Process Systems
030000 – 039999	(03)	[03]	{W03}	Air and Gas
040000 – 049999	(04)	[04]	{W04}	Boiler
050000 – 059999	(05)	[05]	{W05}	HRSG
060000 – 069999	(06)	[06]	{W06}	Dust Collection
070000 – 079999	(07)	[07]	{W07}	Ash and Dust
080000 – 089999	(08)	[08]	{W08}	Steam Turbine
090000 – 099999	(09)	[09]	{W09}	Gas Turbine
100000 – 109999	(10)	[10]	{W10}	Generator
110000 – 119999	(11)	[11]	{W11}	Condensate and Feedwater
120000 – 129999	(12)	[12]	{W12}	Power Distribution
130000 – 139999	(13)	[13]	{W13}	Control Systems
140000 – 149999	(14)	[14]	{W14}	Cooling Systems
150000 – 159999	(15)	[15]	{W15}	Compressed Air Systems
160000 – 169999	(16)	[16]	{W16}	Water Supply and Reclaim Systems
170000 – 179999	(17)	[17]	{W17}	Process Water Systems
180000 – 189999	(18)	[18]	{W18}	Fire Systems
190000 – 199999	(19)	[19]	{W19}	Civil Structures and Facilities
200000 – 209999	(20)	[20]	{W20}	Vehicles, Tools and Equipment
210000 - 219999	(21)	[21]	{W21}	Dams

Note: XXX – Plant areas not applicable to site.

5.2.5 Drawing Revision code

The drawing revision is used to manage the current and previous revisions of a registered drawing. Refer to Appendix 2 - Section 2.7.7 - Drawing Revision Code.

Following the drawing approval process, the latest revision shall be released for personnel to use. The previous revision shall be archived, restricting access from personnel. Previous revision history shall remain permanently in TRIM and be available for retrieval by the Drafting Officer / DMO if required.

The revision number registered in the TRIM metadata is the drawing revision. For example, the first registration of a drawing with a revision of "C" will be registered with a revision "C", not "A" or 1.

5.2.6 Drawing Registration Title

The TRIM drawing title is to be derived from the CAD drawing title block. If not appropriate, the title shall be changed to ensure a searchable and meaningful title. The title will be recorded in a non-abbreviated form wherever possible so as to aid search ability and be compatible with the TRIM to SAP interface. The KKS number should also be applied to the drawing title. The SAP DMS short text field is limited to the first 40 characters of the title, with up to 132 characters of the title appearing as long text description. The CSE drawing number shall be applied to the front of the drawing title to ensure it can be found when linking to SAP. If abbreviations are required they shall be applied in accordance with Corporate Procedure CS-CNTDRW-4.

TRIM Titling Format (PDF)

Drawing Number – Drawing Title – Plant / Strategy Number – Plant Strategy Area

Example 1

KA-110024-001 - Air Cooled Condenser - (11) - Condensate and Feed Water

Example 2

CC-020456-003 - Pulveriser Hydraulic System - Sheet 1 of 2 - [2] - Fuel Process

Network Drive Titling Format (CAD)

Example 1

KA-110024-001A

Example 2

CC-020456-003B

The CAD file name shall be the CS Energy drawing number with the addition of the Revision.

Note: Refer to Appendix 2 for further information.

5.2.7 Drawing Availability Status

An Availability Status code is recorded in the TRIM metadata for each drawing. This code will change as the drawing progresses from an allocated number (AA – no physical drawing yet) through to a drawing released for use (FR – available for use).

The Availability Status code also records the status of drawings both during the updating process or if it becomes superseded or obsolete. The Drafting Officer / DMO shall update the Availability Status code as required to ensure only approved drawings are available for viewing by users.

The availability codes are tabulated below:

Code	Availability Text	Availability Description
AA	Number Allocated	Initial code, used when drawings numbers are requested for reservation. Only use if drawing has not been received.
IA	In Work	Identifies that a drawing is in progress.
AG	Approval granted	Temporary code preceding final release. When “As built” drawings have been approved, status log records the approver.
FR	Final Release	Final code. Used when drawings are approved for use.
AR**	Archived	Archived code used for non current revisions or proposal or tender drawings that did not go ahead.
OB**	Obsolete	Obsolete code used for drawings of demolished or obsolete plant.

Note:

** Non current status, information relating to these drawings can only be retrieved by the Document Management Officer.

In all drawing availability statuses other than FR (Final Release) the drawing is to be searchable but not viewable by the user other than the DMO. Therefore the Drafting Officer / DMO must change the viewing characteristics of the TRIM record to prevent the user from accessing it. Where the user is unable to view the drawing they should refer to the DMO, the drawing will exist however may contain errors or the relevant plant is being modified.

5.2.8 Drawing Type

The type of Drawing shall be recorded in accordance with the table codes below:

Code	Drawing Type
0	Data sheets and Calculations
1	Site Layouts
2	Civil works (Concrete, Steelwork, Architectural)
3	Mechanical
4	Electrical

5	Pipe work Isometrics
6	ICMS and DCS
7	Process and Instrumentation Diagrams
8	Single Line Diagrams
9	General arrangements
10	Communications
11	Underground services

5.2.9 Drawing Storage Location

All electronic CAD drawings shall be stored on the designated CSE network drive, TRIM is unable to support layered CAD files. A PDF copy will be made from the source CAD file and shall be stored in TRIM.

Where a drawing is only available in hard-copy, the storage location shall be recorded in TRIM. If these drawings require updating, they will be developed in AutoCAD. The updated CAD file will become the new Master document; a PDF copy will be made and shall be stored in TRIM.

5.2.10 Printing of Drawings

All printed copies of PDF files shall be watermarked / stamped "Uncontrolled in Hard Copy Format".

5.3 Hardcopy Libraries

5.3.1 Storage Systems

DMO's shall store all wet signed and master print drawings in appropriate cabinets such that they can be readily located and retrieved.

5.3.2 Master Print Storage Requirements

Drawings only available in hard copy format shall have the Master prints stored in appropriate cabinets within the site's main Document Management Centre (DMC). These drawings will be stamped as Master Print and shall not be removed from the DMC. Scanned images and / or copies of the master print shall be provided for use or revision purposes.

Master prints are only permitted to leave a DMC in the custody of the DMO for the express purposes of reproduction.

5.3.3 Signed Hardcopies (Approval Process)

At the completion of (internal) drawing approval, the drawing shall be printed in full scale. The signatures of the Draftsperson, Checker, Designer, Design Reviewer, and Approver (as applicable) shall be made on the print and stored in the main DMC, replacing the previous revision's signed copy.

5.3.4 Controlled Libraries

The main DMC at each site will be controlled and shall contain only the latest revision of drawings, with the exception of previous versions that are not in electronic formats.

Access to the main DMC shall be with the knowledge of the DMO. The main DMC is to be locked outside of hours.

Some sites have satellite controlled libraries. The DMO shall ensure these controlled libraries are updated when drawings are revised.

The DMO shall maintain a Controlled Library register to ensure all controlled copies are updated when a drawing is revised.

During the update phase of a drawing (availability status code IA) "In Work" the TRIM PDF version is withdrawn from circulation. In like manner, the DMO shall withdraw hardcopies from controlled libraries. Upon the drawing availability status reverting back to Final Release ("FR"), hard copies are to be printed and filed in the controlled libraries.

5.3.5 Uncontrolled Libraries

Uncontrolled libraries and drawings within these are to be clearly marked as "Uncontrolled in Hard Copy Format". These libraries may not contain current drawings and should be used for reference purposes only.

Upon final release of a new or updated drawing the uncontrolled libraries are to be updated with a copy of the latest revised drawing by the DMO.

5.3.6 Copies

All copies of drawings issued from the DMC or drafting office other than to controlled libraries shall be stamped as "Uncontrolled in Hard Copy Format".

6 Responsibilities & Accountabilities

DMO:

- To allocate drawing numbers
- To maintain the registration details of drawings throughout the revision process
- To ensure controlled and uncontrolled Libraries are updated.

Drafting Officer:

- To ensure drawings comply with Australian and CSE Standards
- To allocate drawing numbers
- To maintain the registration details of drawings throughout the revision process
- Confirm all specified and relevant quality control checks have been competently completed
- Ensure drawings are approved by the appropriate officer.

RPEQ:

- Drawings that are developed or amended to reflect a design or functional change will require RPEQ approval.

7 Definitions

DMS	Document Management System
DMO	Document Management Officer
Drafting Officer	CSE nominated Draftsman or Officer delegated by the site Technical Services Superintendent
RPEQ	Registered Professional Engineer of Queensland
DMC	Document Management Centre
Wet Signed	The hardcopy drawing with the original signatures
CSE	CS Energy
CAD	Computer Aided Drafting

8 Trim to SAP Interface Mapping

Example - Record Type – Drawing PDF (Kogan Creek)

The screenshot shows a 'Properties' dialog box for a drawing PDF. The 'General' tab is active, displaying the following information:

- Drawing Title:** KA-010004-001 - KA10EAC41/42 Conveyors - Crushing Station to Transfer Tower - (01) Fuel Supply System
- Folder:** F/10/10037 (Enclosed?)
- Drawing Number (CS Energy):** KA-010004-001
- Drawing Number (Previous):** AUS377-XG02-10EAC-086484
- Drawing Status:** FR – Final Release (Approved)
- Drawing Revision:** 2
- Drawing Type:** 7 P & IDs (Official or Library Copy Held?)
- Date Created:** Wednesday, 24 November 2010 at 8:35:05
- Date Approved:** 9/02/2006
- Contractor:** Roberts & Schaefer Australia
- Drawing Number (Contractor):** (Empty)
- Current Location:** <At Home Location>F/10/100
- Owner Location:** KOGAN CREEK POWER STATION
- Access Control:** View Document: CS ENERGY (org) (bas)

TRIM to SAP Linked Fields for PDF Drawing Record Type

TRIM		SAP
TRIM Record Number	=	Document Reference Number
Drawing Title	=	Short Description / Long Description

9 Reference Documentation

AS1100	Technical Drawing
AS1101	Graphical Symbols for General Engineering
AS1102	Graphical Symbols for Electro-technical documentation
AS1000	The International System of Units (SI) and its application
AS1046	Letter Symbols for use in Electro-technology
CS-CNTDRW-4	Plan Library – List of Abbreviations
MQP-AD-0004	Drawing Supply and Control (Mica Creek)
SW-QP-5/9	Drawings Control (Swanbank)
CMP-AD-0005	Revising Existing and Creating New Drawings (Callide)

10 Document History

Rev. No.	Author	Checked	Approved	Comments
0	P McLatchey	W Underhill	D Bell	Original issue – Derived from CS-CNTDRW-1: Plant Library Management. Written specifically in relation to drawing management for new build Power Stations.
1	W Underhill			10 Feb 2011 – Amendments including flow chart, CSE drawing number application, plant areas, titling and TRIM / SAP interface.
2	W Underhill L Weber	D Donges S Collard C Dudman	D Bell	04 Mar 2011 – Integrated Major Projects Drawing Standards Appendix 2 and amended procedure around saving CAD files into network drive rather than TRIM (TRIM unable to support all CAD files). 15 April 2011 – Updated with comments from key stakeholders.

Appendix 1 – RACI Chart

A RACI Chart is used to clarify roles and responsibilities in an organization. It is a table that provides a list of activities and information about roles different people have in relation to those activities. For each activity, different people are designated a letter in the acronym “RACI”.

Responsible – the role doing the work / owns the process

Accountable – the role responsible for making sure the work is done adequately / to whom “R” is accountable / approver

Consulted – role(s) who should be asked for input as they have relevant knowledge or capability

Informed – role(s) that must be told about the work or outcomes

Can only be 1 “R” for an activity. Same role can be both “R” and “A”.

Activity	Responsible	Accountable	Consulted	Informed
Update CSE Drawing Management Procedure	Asset Specialist	Technical Services Manager	Site Technical Services Superintendent Drafting Officer / DMOs	CSE Technical staff
Ensure drawings comply with Australian and CSE Standards	Drafting Officer / Projects Team	Site Technical Services Superintendent	CSE Technical staff	CSE Technical staff
Ensure the registration & transition of drawings from projects / modifications	Projects Team / Modification Officer	Projects Team / Modification Officer	Site Technical Services Superintendent	CSE staff
Allocate drawing numbers	Drafting Officer / DMO	Site Technical Services Superintendent	CSE Technical staff	CSE Technical staff
Ensure drawings are updated as per Plant Modification process	Drafting Officer / DMO	Site Technical Services Superintendent	CSE Technical staff	CSE staff
Ensure linkages to Material Master & FLOC Master Data are updated in line with new revisions	Drafting Officer / Projects Team	Site Technical Services Superintendent	CSE Technical staff	CSE staff
Approval of CSE generated or amended drawings (Note 1)	Drafting Officer / RPEQ / Projects Team	Site Technical Services Superintendent	Drafting Officer	CSE Technical staff
Approval of externally generated drawings for new plant or equipment	Projects Team	Project Manager	Site Technical Services Superintendent Drafting Officer / DMOs	CSE Technical staff
Storage of hardcopy master prints	DMO	DMO	Drafting Officer	CSE staff
Updating of ‘Controlled’ satellite libraries	DMO	DMO	CSE Operational staff	CSE Operational staff

Note 1: Allows discretion for the Drafting Officer to gain the required approval from site or corporate staff. If any doubt exists seek guidance from the site Technical Services Superintendent.

Appendix 2 – CAD Drawing Standards



CS ENERGY

DRAWING STANDARDS

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1 GENERAL INFORMATION

1.1 Purpose

To establish and maintain a standard for CAD drawings to be supplied both internally and by external contractors.

To a lesser extent this document will also address GIS standards associated with the services, structures and data external to the buildings on CS Energy sites.

1.2 Scope

This standard considers drawing creation and file exchange only. It does not encompass either drawing management or archiving. This standard shall apply to all CS Energy new builds from Kogan Creek A Station onwards, and to existing sites whose drawing templates will be modified where appropriate to align with the new standard.

1.3 Deliverables

The deliverables of this standard are:

- This document
- An AutoCAD drawing template that complies with Australian standards, or with American National CAD Standards (NCS) or International standards, where the Australian standard is not specific enough or is lacking

2 CAD DRAWING GUIDELINES

2.1 Drawing Reference Standards Documents

All drawings are to comply with the relevant Australian Standards, which as a minimum include; AS1000, AS1046, AS1100, AS1101, AS1102. However, given that these standards in some cases are nearly 20 years old, allowances have been made to include approaches from both the NCS and ISO13567 where appropriate.

The final drawing template is an amalgamation of the three standards.

The blocks for items of plant are listed in drawing A2-STD-00001-05.dwg. These blocks will be made available to the contractor through the template and can be requested as a drawing in its own right.

2.2 CAD Drawing Format

All new project work is to be received in AutoCAD format, so this document addresses the drawing standard requirements for AutoCAD only, although reference will be made to Microstation where appropriate.

The matrix between the drawing release and the software version is shown in Figure 1. This matrix is critical because if the contractor uses more recent software versions than CS Energy, then when they send files CS Energy will be unable to open them, unless the contractor saves to an earlier version. It is always possible, if using the most recent software versions to open drawing files that use older drawing release versions, although some of the functionality requirements will be missing from older versions.

Because of this issue, all drawings will be received in AutoCAD 2010 drawing release version for **ALL** existing and new infrastructure. If the drawings need to be converted to Microstation (DGN) format, then this will be done by internal staff after the files are received.

Figure 1

AutoCAD DWG Release Version	AutoCAD Software Release Version(s)
AutoCAD 2000/LT2000 Drawing	2000-2003
AutoCAD 2004/LT2004 Drawing	2004-2006
AutoCAD 2007/LT2007 Drawing	2007-2009
AutoCAD 2010 Drawing	2010-2011, possibly 2012

The sites have varying needs requiring Microstation and AutoCAD, as some sites were constructed in one or the other. The mix is shown below in Figure 2.

Figure 2

CS ENERGY Site	File Format
Kogan Creek	AutoCAD
Callide	Microstation and AutoCAD

2.3 CAD Drawing Control – Electronic Submission

The contractor shall provide an electronic copy of all drawings.

2.3.1 Specific Contractor Deliverable Requirements (for Drawings)

Prior to issue, all drawings shall have the PURGE command executed on them to remove unused blocks, layers, text and dimension styles. This process is to be executed to include all unreferenced nested blocks.

Without exception, contractors must deliver:

- Digital .DWG files in 2010 Drawing Release version format using the CS Energy supplied template (.DWT)
- Digital PDF files of drawings
- If preferred by Project Team, digital DWF files of drawings
- Drawing database listing all associated drawings used and referenced in .xls format
- External reference drawings (Xrefs) must remain distinct, that is, do not bind them into the main drawing. Use the eTransmit command to achieve this.

Note: .DXF files are unacceptable.

2.3.2 Specific Contractor Deliverable Requirements (for GIS)

- Where relevant for site information, a contractor that has access to AutoCAD Map 3D, MapInfo or ESRI products will create .SHP files of the layers as one of the final required deliverables

2.3.3 Drawing Database Deliverable

The Contractor shall provide an electronic database of all drawings with all necessary drawing registration details. These shall be to the approval of the Superintendent, but the following are typical. Any GIS files created shall also be listed as part of this database.

This shall be provided in Microsoft Excel format (.xls).

Field Name	Description	Details
CONTRACTOR	Contractor name	
CONTRACT NO.	Contract number	
DMS_CONTRACTOR_DWG	Contractor drawing number	
DMS_SUB_CONTRACTOR	Subcontractor name	
DMS_SUB_CONTRACTOR_DWG	Subcontractor drawing number	
SHEETNO	Sheet number	3 digits
VR	Revision number	1 letter or 2 digits
DKTXT	Short description 40 characters	
TXLINE_01	Long text 80 characters	
DAPPL	Electronic file type	DGN - Microstation DWG - AutoCAD TIF, PDF, DWF SHP - GIS data
FORMAT	Drawing size	A1, A2, A3, A4, etc
FILEP	File name	<site>-<drawing number>-<sheet number>-<revision> <short title>
DRAWING STATUS	Drawing status	Dwg status A – As built
NEW BLOCKS	Blocks added to Drawings	List the blockname and the drawing where it is found
Owner_Number	Owner's drawing number	6 digits

2.3.4 Quantity

One copy of all digital drawing files and associated files is acceptable using eTransmit.

2.4 CAD Drawing Quality Assurance (QA)

This is currently an internal CS Energy process performed through a manual audit process.

Going forward there are plans to utilise the Check Standards (.DWS) and Layer Translator tools in AutoCAD to streamline this process.

2.5 CAD File Naming

Any CAD file produced for CSE by internal or external draftsman shall be immediately registered in TRIM and allocated a CSE drawing number before any drawing is commenced. The CSE drawing number shall be applied as the CAD file name, including the revision code. Refer to Section 2.7.7 – Drawing Number / Revision Code.

2.6 Coordinate System

The datum is the Geocentric Datum of Australia (GDA94).

The coordinate system in use for all CS Energy sites is the Map Grid of Australia, Zone 56, or MGA-56.

Each CS Energy site has specific permanent survey markers (PSM) that are used to locate and reference data. The specific X, Y, Z coordinates of these PSM are shown in Section 3.2 – Site PSM Coordinates.

For a major piece of equipment / asset or project installation, it may be desirable to design the asset on a local coordinate system using an arbitrary grid, as this will ensure that there are no inaccuracies due to coordinate system projection. IF this is deemed necessary, then each CAD drawing set-up in a local coordinate system (using a local grid) must be related back to the relevant world coordinate system. This will be accomplished by referencing several of the local coordinate system's points with the actual coordinate system X,Y,Z values shown as attribute text. Preferred points are the equivalent of the local coordinate system's 0,0,0, or project boundary edge points and known building corners. The real world coordinate system's grid, which is provided as a template layer, must also be shown in the proper world coordinate location.

The coordinate system for these drawings must be indicated in the title block as local grid and the 0,0,0 must be listed with its real world coordinate system value, even if it is not visible on the drawing in question.

2.7 Title Block

The title block is based on AS1100.101 guidelines and strictly adheres to these guidelines for size and margins. The title blocks are included on each layout in the drawing template.

The specific requirements for the title block are listed in Figure 3 on the following page.

2.7.1 General Information

All of this information **MUST** be included on the title block. Spaces with labels have been provided for each item so that a new user knows where to place the information. Figure 3 below shows the information required for the title block and the CS Energy method of creating it.

Note that the title block itself is provided in the layouts of the template, so there is no requirement for a contractor to create one directly. If a title block needs to be inserted into a drawing they are to be inserted at full scale on the layout. The scaled viewport sits inside the title block.

Figure 3

Title Block Information	Method of Creation
Name of Company (Design Authority) including address, phone and e-mail	Drawing Utilities→Drawing Properties→Custom fields
Drawing Title	Drawing Utilities→Drawing Properties→Custom fields; for specifics refer to Section 2.7.5 below
Drawing Number	Field set to filename; for specifics refer to Section 2.7.7 below
Drawn By name and signature	Drawing Utilities→Drawing Properties→Custom fields
Checked By name and signature	Drawing Utilities→Drawing Properties→Custom fields
Approved By name and signature	Drawing Utilities→Drawing Properties→Custom fields
Dates	Field set to today's date; update as required
Viewport Scale	Drawing Utilities→Drawing Properties→Custom fields
Viewport	Part of title block, already exists
Coordinate System and Datum used	Drawing Utilities→Drawing Properties→Custom fields
Units of Measurement	For example, meters vs. millimetres. Drawing Utilities→Drawing Properties→Custom fields
Sheet Size	Entered as text into each layout
Sheet Number	Drawing Utilities→Drawing Properties→Custom fields; for specifics refer to Section 2.7.6 below
Drawing revision code	Drawing Utilities→Drawing Properties→Custom fields; for specifics refer to Section 2.7.7 below
Drawing Reference Table	Lists drawings that reference or are referenced by the current drawing. For specifics refer to Section 2.7.8 below

NOTE: Not all fields are required in each drawing. For example. An electrical schematic does not require coordinate system and datum information. Still, each field must always be filled in regardless. So if a field does not need to be used, then it should be filled in as N/A.

2.7.2 Attributes

All border information including: drawing title; revision details; referenced drawings; must be inserted using the attributes attached to the border.

2.7.3 Status Stamp

The drawing sheet contains a “Preliminary Only Not for Construction” stamp above the description column. This layer must be turned on until the drawing is issued as “Approved for Construction” or “As Built”.

2.7.4 Vendor Information

Vendor and/or consultant information displaying vendor drawing number and logo shall be attached to the bottom right hand corner of the drawing inside the border on layer “Vendor”. The size of the block shall not be greater than 5% of the drawing sheet.

2.7.5 Drawing Title

The Drawing Title is to be unique and fully descriptive. It shall be free of spelling and grammar mistakes. The title should be free of abbreviations where space permits, however if required they shall be applied in accordance with CSE Procedure CS-CNTDRW-4. The standard title format consists of the following components:

- Line 1 Site, Station and Unit number (if not common to all units)
- Line 2 Plant Area Strategy
- Line 3 Detailed description
- Line 4 Drawing type and / or sheet number of sheets.

Example 1	Example 2
KOGAN CREEK A STATION	Callide C STATION
Condensate and Feed Water	Process Fuel
Air Cooled Condenser	Pulveriser Hydraulic System
General arrangement	P&ID Sheet 1 of 2

The drawing title shall clearly state which station unit number(s) the drawing applies to if it does not apply to all. This is a particular requirement for plant modifications, during which time it is possible to have both the original and modified plant concurrently, though on different units.

2.7.6 Sheet Number

The sheet number is used when a set of drawings is required to capture the full information. In this case the separate drawings that make up the set are identified by the same drawing set number and a unique sheet number.

Examples of drawings that often require multiple sheets include:

- Electrical single line diagrams
- Electrical load lists (if produced in drawing format)
- Underground services (separate sheets for each cell identified on the overall grid)
- Some process and instrumentation diagrams of involved processes
- Logic diagrams

2.7.7 Drawing Number / Revision Code

Drawing numbers will be provided by the site Drafting Officer / DMO in the requested quantities for each required plant strategy area.

The drawing revision is used to manage the current and previous revisions of a registered drawing. The current revision shall have the highest number/letter as appropriate.

Prior to a drawing obtaining an “As Built” status, drawing revisions will be numeric starting with zero (0). When a drawing status is changed to “As Built”, the revision is changed to “A”. Future revisions of this drawing will continue in the alphabetical series with the exclusion of “O” and “I”. The 25th revision after achieving “As Built” status will be “AA”.

When a drawing is changed or revised the same drawing number is kept and the next revision number assigned.

Note that multiple revisions of the one drawing number are uniquely identified using the revision number. Design and construction revisions use numbers such as 1, 2, 3, etc. while as built drawings use letters such as A, B, C. For example:

KA-053456-0061.pdf	(Construction Rev 1)
KA-053456-0062.pdf	(Construction Rev 2)
KA-053456-006A.pdf	(‘As Built’ Rev A)
KA-053456-006B.dwg	(‘As Built’ Rev B)
KA-053456-006C.dwg	(‘As Built’ Rev C)

2.7.8 Drawing References

Reference and related drawing numbers shall be identified on the drawing. These reference drawings are to be recorded in the “reference table” of the drawing sheet.

Where a package of related drawings is requested, a separate drawing schedule shall be supplied listing all drawings within the package. This drawing schedule shall have its own drawing number (either separate drawing number or sheet number) and shall be referenced on all drawings in the package.

Subcontractor’s drawings shall be cross referenced to the Contractor’s drawings.

2.8 Layouts and Drawing Sheets

All Australian standard layouts will be represented. These are A0, A1, A2, A3 and A4 based on accepted ISO paper sizes. The scales associated with each layout will vary and will be set by scaling the viewport.

The layouts, complete with title block and viewport, are included with the drawing template. Layouts that are not needed can simply be deleted from the newly created drawing file.

The layout sizes in mm are listed in Attachment 3.3.

Preferred Sizes

The preferred size for geographic site plan use is A1.

The preferred size for Control and Instrumentation systems is A3.

The preferred size for Logic Diagrams is A3.

2.9 Page Setup Manager and Plotting

Page setups will be used to ensure that each layout size has a distinct layout. All layout plots will be scaled at 1:1 to follow best CAD practise; only the viewport will be scaled.

2.10 Fonts and Text Styles

All drawings will use the Arial font exclusively. Arial is the CS Energy corporate standard font. Australian Standards AS1100.101 indicates that either upright or sloping Gothic or ISO3098/1 upright or sloping fonts are acceptable. However, this standard was published in 1992 and last amended in 1994. During the intervening 18 years, programs have become more Windows compatible and the majority of programs now come standard with a series of true type fonts, Arial included among them. Arial is now one of the most widely used and recognised fonts in the world, so while this font does not comply with the Australian standards it meets CS Energy’s corporate standard and will therefore be used in all new drawings.

Existing drawings which use Gothic or IS3098/1 fonts can continue to do so, although it is recommended to update text styles whenever possible.

Model Space Annotation

Almost all text is to be created in model space. This includes:

- Dimensions and multileaders,
- Labels,
- Block attributes.

Paper Space Annotation

Several annotations must be done in paper space. These are listed below.

- Title block text
- Tables of materials lists and part numbers (where relevant)

Text Size on Paper

The AS1100 standard for this is listed in Attachment 3.3. All text styles adhere to these requirements. Text styles have been created to adhere to the text sizes required. These are shown in the table below.

Text Style Name	Text Style Height	Annotative?	Usage Restrictions
ARIAL-TTBL	User input required	No	PAPER SPACE ONLY
ARIAL-2.5mm	2.5 mm	Yes	MODEL SPACE ONLY
ARIAL-3.5mm	3.5 mm	Yes	MODEL SPACE ONLY
ARIAL-5.0mm	5.0 mm	Yes	MODEL SPACE ONLY

2.11 Dimensions

All dimensions will be created in model space using annotative scaling and the Arial text style. The creation of dimensions in paper space is unacceptable, as they will not scale properly if the viewport scale changes.

Dimension styles will be provided in the template that will ensure that the final text size on the finished product is AS1100 compliant. The names are:

- CSEDIM_2.5
- CSEDIM_3.5 (only for use with dimensions for A0)

All dimensions are to be created as associative dimensions using the dimension styles provided in the template and they shall not be exploded to their primitive graphics (lines, arcs and text).

2.12 Drawing Scale

All drawings shall be drawn in model space at full scale, also called 1:1. The only exceptions are drawings for system and electrical schematics, single line diagrams and logic diagrams. These items do not have to be drawn to scale.

Drawings shall be scaled by scaling the paper space viewport. Commonly used scales are listed below, although others may be used if required.

1:1 1:10 1:100 1:1000 1:10000
 1:2 1:20 1:200 1:2000
 1:5 1:50 1:500 1:5000
 1:25 1:250 1:2500

2.12.1 Drawing Scale List Changes in AutoCAD

For drawings where the standard drawing units are in meters, the Standard Scale List will have to be revised in order to meet the standard. The content of the modified scale list is shown below for commonly used scales, but essentially each scale unit is divided by 1000 to obtain the drawing unit value. The list of scales below will be provided in the drawing template for drawings in meters but it is up to contractors to add any other required scales into the scale list.

Drawing Scale	Drawing Scale List Entry
1:1	1 Paper unit = 0.001 Drawing units
1:2	1 Paper unit = 0.002 Drawing units
1:250	1 Paper unit = 0.25 Drawing units
1:500	1 Paper unit = 0.5 Drawing units
1:1000	1 Paper unit = 1.0 Drawing units
1:2500	1 Paper unit = 2.5 Drawing units
1:3000	1 Paper unit = 3.0 Drawing units
1:5000	1 Paper unit = 5.0 Drawing units
1:7500	1 Paper unit = 7.5 Drawing units
1:10000	1 Paper unit = 10.0 Drawing units
1:15000	1 Paper unit = 15.0 Drawing units

2.13 Drawing Units

All site and large scale drawings will use meters as their units. Drawings with imperial units delivered to CS Energy will be deemed unacceptable and will be returned for rework. The project will not be signed off until the drawings have been done in metric units of meters and delivered to the client, CS Energy.

For structural, electrical and mechanical drawings it is acceptable to millimetres as the drawing unit. All other stipulations are the same as for drawings created in meters.

2.14 Layers

All layers must use BYLAYER conventions, and all objects must obey these conventions. Where a contractor believes there is a reason to create objects that are not BYLAYER compatible, they must discuss it directly with the CS Energy Project Supervisor. The BYLAYER convention is critical for the tracking of assets and features at CS Energy and must be strictly observed.

Drawing the majority of data on layer 0 and changing colour/linetype is unacceptable. No drawing or drawing reference shall be done on layer 0, this layer is to be kept empty except for the production of blocks Refer to 2.15 – Blocks.

No drawing or drawing reference shall be done on layer defpoints.

As part of the template standard, CS Energy will provide a list of layers with associated colours, linetypes and lineweights in a layer matrix (reference the document name).

2.14.1 Paper Space layers

Some layers will only be used in paper space. These include titleblock, viewports, logo.

2.14.2 Colours

All colours are to be used as a BYLAYER convention.

2.15 Blocks

CS Energy standard blocks will be provided as part of the standard template. Where new blocks need to be created/added, these will be listed in the Drawing Database deliverable as indicated in Section 2.1 – Drawing Reference Standards Documents.

All new blocks that are created will be created on layer 0 so that they maintain BYLAYER and BYBLOCK conventions.

2.16 Linetypes

Default linetypes need to be used, unless custom linetypes are included in an eTransmit file.

All linetypes are to be metric where 1 unit = 1mm and conform to AS1100. Entity linetypes are to be set to “**BYLAYER**” and using acadiso.lin . Under no circumstances shall any new linetypes be created unless approved by the Project Superintendent. Only line types standard to AutoCAD will be used. The following table lists the linetypes to be used.

Fig (A)

DESCRIPTION	AUTOCAD NAME
CONTINUOUS	CONTINUOUS
CENTRE	CENTRE2
HIDDEN	DASHED
SHORT HIDDEN	HIDDEN2
PHANTOM	PHANTOM

2.17 External References

All external references used are to be treated as attachments, NOT overlays. Nested external references are unacceptable if inserted as an overlay.

2.17.1 Base Drawing Xref

For contract and project work, CS Energy will provide a survey accurate base drawing file in GDA94/MGA-56 that will be used for the duration of the work to be undertaken by the contractor. This .dwg is not to be moved or shifted to another location under any circumstances. The base drawing information provided by CS Energy is to sit in its original coordinate system and any other CAD information that is included must ensure that all data sits accurately in the CS Energy sanctioned coordinate system and lies correct on the base .dwg file. Or, if the drawing is in its own coordinates, it must specify real world coordinates as detailed in Section 3.2.

2.17.2 Raster Files

Raster files will be provided by CS Energy to the contractor for the duration of the project. The current preferred format for 2D raster files is .TIF with its associated TFW file.

2.18 Orthographic Drawings - Projection

All orthographic drawings will be produced in Third Angle Projection.

2.19 Hatching

All hatch must be associative with each hatch created as a separate entity. All hatching shall have their hatching pattern on a specific hatch layer and **not a common hatch layer**.

Regarding the hatch pattern itself, the SOLID pattern and the ANSI 31 pattern are acceptable.

2.20 Sheet Sets

Sheet sets are not currently used at CS Energy, but are under consideration as they are an excellent method of creating project management within AutoCAD for a series of project drawings. They may certainly be used by contractors and supplied to CS Energy with all of the relevant drawings.

2.21 Plotting

All plots will plot at 1:1.

The .ctb files will be used. If in colour, acad.ctb will be used. If black and white, monochrome.ctb will be used. This use of standard AutoCAD .ctb files is intended to keep the plotting standard very simple.

No pen widths will be assigned. Instead, lineweights will be used.

2.22 Drawing Exchange - eTransmit

File exchange will occur using the eTransmit command in AutoCAD so that all font types , plot files, external references and other relevant information is included.

3 Attachments

3.1 Plant Area Strategies

Drawing Number Range	Plant
010000 – 019999	Fuel Supply Systems
020000 – 029999	Fuel Process Systems
030000 – 039999	Air and Gas
040000 – 049999	Boiler
050000 – 059999	HRSG
060000 – 069999	Dust Collection
070000 – 079999	Ash and Dust
080000 – 089999	Steam Turbine
090000 – 099999	Gas Turbine
100000 – 109999	Generator
110000 – 119999	Condensate and Feedwater
120000 – 129999	Power Distribution
130000 – 139999	Control Systems
140000 – 149999	Cooling Systems
150000 – 159999	Compressed Air Systems
160000 – 169999	Water Supply and Reclaim Systems
170000 – 179999	Process Water Systems
180000 – 189999	Fire Systems
190000 – 199999	Civil Structures and Facilities
200000 – 209999	Vehicles, Tools and Equipment
210000 - 219999	Dams

3.2 Site PSM Coordinates

Site Name	PSM Number	Coordinate System	Easting	Northing	RL
KOGAN CS	152961	MGA-56*	28005.475	7020574.579	311.356
KOGAN CS	152962	MGA-56	275897.785	7020142.254	334.746
KOGAN CS	152963	MGA-56	276070.27	7021524.052	349.964

* Datum = GDA 1994, Projection = Map Grid of Australia, Zone 56

3.3 AS1100.101 – Required Paper and Text Sizes

PAPER SIZE	FULL SIZE (mm)	SIZE WITHOUT FILING MARGIN (mm)	TITLE & DWG NUMBERS	SUBTITLES & HEADINGS	VIEW&SECTION DESIGNATIONS	NOTES	MATERIALS LISTS	DIMS
A0	841x1189	801x1149	7	5	5	3.5	3.5	3.5
A1	594x841	554x801	5	3.5	3.5	2.5	2.5	2.5
A2	420x594	400x574	5	3.5	3.5	2.5	2.5	2.5
A3	297x420	277x400	5	3.5	3.5	2.5	2.5	2.5
A4	210x297	190x277	5	3.5	3.5	2.5	2.5	2.5

4 CSE Drawing standards

Drawing Sheet

AutoCAD drawings shall be submitted complete within CS Energy drawing borders.

No modifications are permitted to drawing sheets or file names.

Form Number	Description
CSE A0.dwg	A0 Drawing Sheet Border
CSE A1.dwg	A1 Drawing Sheet Border
CSE A2.dwg	A2 Drawing Sheet Border
CSE A3.dwg	A3 Drawing Sheet Border
CSE A4.dwg	A4 Drawing Sheet Border
CSE Cable.xls	Cable Schedule
CSE Drawing Schedule.xls	Drawing Schedule