Specification

Works as Constructed (WAC) Drawing Asset Information Specification

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Revision details

Version No.	Clause	Description of revision
4	4,5	Change of name and scope to focus on the submission, acceptance and processing of WAC drawings
	4.14	Alignment of status terminology
	4.8, 6	Clarification of red line drawings not being accepted as WAC drawings
	6	Added detail to title block information and WAC Stamp
3	3	Update reference
	4	Update reference
	5	EDMS added
	6.1	Numbering System EDMS Reference added
	6.2	New drawings number process EDMS Reference added
	6.3	New File Naming process EDMS Reference added
	7.8	(a) Title update (b) Added examples for Title 1 and Title 2
2	4	Template names Altered
	6.7	(g) Signature box altered to allow supersede box
	13	Template names altered
	Appendix 3	Sample sheet altered to include superseded box
1		General Document Revision

General

This Specification is for the design, supply and construction of Sydney Water assets.

Sydney Water makes no warranties, express or implied, that compliance with the contents of this Specification shall be sufficient to ensure safe systems or work or operation.

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General Terms & Definitions

Term	Definition
EDMS	Engineering Drawing Management System. Modules include: • Meridian Power Web (workflows, administration, native files download, create projects folders) • Meridian Explorer Web (search, print, download WAC pdf renditions) Meridian Contractor Portal (iOCP & eOCP) – general users
Meridian	Software product name for the EDMS application, by Onset Design (Software Vendor)
iOCP	EDMS Meridian **Internal** Onset **Contractor Portal** (Engineering Drawings & Projects)
eOCP	EDMS Meridian **External** Onset **Contractor Portal** (Projects Only)
Draft	Drawings that are still in working phases and are indicative
Issued	Drawings considered by Sydney Water as final and a source of truth for asset information
Concept	Drawings displaying potential plans for a site that are in the early phases of the design process
Issued For Construction IFC	Drawings that detail the design of infrastructure that is to be constructed. These drawings are often referred to as Issued for Construction (IFC) drawings.
Work as Constructed	Drawings that detail how infrastructure has been constructed based on recorded measurements of the completed works
Spatial Hub	Sydney Water's browser-based application that allows you to view property and network information that is captured in HYDRA alongside base mapping information from Bing, Google and Open Street Maps
HYDRA	Sydney Water's corporate Geographic Information System (GIS). It is a seamless spatial database of land services system and environmental information covering the entire area of operations.
MAXIMO	Manages Sydney Water's operational assets and their life-cycles by enabling planning long-term strategic asset maintenance and replacement of critical assets.
SWDP SW Delivery Portal	Sydney Water Delivery Portal. Enables efficient collaboration between internal stakeholders and delivery partners with external consultants and contractors to deliver Sydney's water infrastructure project needs.
SWIM	Sydney Water Information Management (SWIM) repository.

1. Introduction

1.1 Purpose

Accurate, complete, consistent and unambiguous engineering drawings are essential for the ongoing operations and maintenance of Sydney Water's assets, enabling safety, environmental protection and asset performance. The purpose of this specification is to define Sydney Water's Work as Constructed (WAC) drawing requirements for Engineering Drawing Management System (EDMS) submission to our staff and partners engaged in the asset creation and ongoing management of SWC assets. This document is intended for Engineers, Designers/Drafters and Project Managers to create a seamless WAC drawings submission process.

1.2 Scope

This document details the specifications and minimum requirements for submission of all WAC drawings prepared for Sydney Water ensuring adequacy and consistency creating and maintaining drawings of SWC assets.

Where there is ambiguity, discrepancy or inconsistency between this document and the drafting requirements set out in relevant Sydney Water editions of the WSAA codes, this document shall be followed. This document and attachments are available on the Sydney Water website and the SW Delivery Portal.

1.3 Proprietary items

Nomination of a proprietary item by Sydney Water does not imply preference or exclusivity for the item identified.

Alternatives that are equivalent to the nominated items can be submitted to Sydney Water for acceptance. The submission must include appropriate technical information, samples, calculations and the reasons for the proposed substitution, as appropriate.

2. Specification in detail

2.1 General Requirements

Work As Constructed (WAC) drawings need to meet Sydney Water's defined standards for format, file type, content, submission process and information security. The general requirements for WAC drawings are apply to the following categories:

- Drawing File Preparation Requirements
- Drawing Title Block Content Requirements
- Drawing Format
- Drawing Submission Process and Information Security

Drawing File Preparation Requirements relating to file type, external references and content management can be found in the subsequent sections, which are listed as follows:

a) 4.4 Drawing Format Requirements
b) 4.6 Drawing Sheet Size
c) 4.7 Drawing Environment
d) 4.17 Use of External References
e) 4.18 Use of Multiple Sheet Layouts

Drawing Title Block Content Requirements relating to the content requirements inside the drawing frame including the title block frame, border, logos etc can be found in the subsequent sections, listed as follows:

a) 4.2 Drawing Numbers
b) 4.3 Drawing File Name
c) 4.13 Title Block Information
d) 4.14 Revision Status of WAC Drawings

Drawing Format configuration requirements are in the below sections:

a) 4.4 Drawing Format Requirements
b) 4.6 Drawing Sheet Size
c) 4.8 Entity Colour and Line Weights
d) 4.9 Text Styles
e) 4.10 Dimensioning Style
f) 4.11 Line Types
g) 4.12 Layering Structure

Drawing Submission Process and Information Security relating to drawing submission workflows and information security can be found in the forthcoming sections listed below:

a) 4.5 Equipment Drawings
b) 4.15 Amendments to Checked Out EDMS WAC Drawings
c) 4.16 Information Security and Access Control

WAC drawings shall be submitted to EDMS via a drawing(s) “Book-In” request as per Section 2.2.13. This will allow an EDMS Power Web User “Requestor” to initiate the workflow in EDMS to a reviewer and/or updating Sydney Water’s GIS information system (HYDRA). If WAC drawing(s) is accepted by the EDMS “Reviewer”, then the EDMS workflow will progress to the EDMS Power Web User “Approver” step, followed by WAC drawing publishing/release to the EDMS Engineering Drawings Master database vault.

If WAC drawings are rejected in EDMS by the “Reviewer”, then a “Correct Rejection” comment will be flagged on the rejected drawing(s), for resubmission by the initial submitter/designer/contractor.

If you have large numbers of WAC drawings of different asset categories (linear + facility assets, electrical + civil/mechanical drawings, for example) for the same project, it is recommended that separate WAC "book-in" requests are submitted into EDMS Meridian Contractor Portal. This will facilitate easier workflow initiation selections by the EDMS Power Web User (Requestor), as different EDMS Power Web User (Reviewers), will need to action the WAC drawings review in EDMS.

For Facility assets, the Sydney Water Project Engineer or Project Manager, or WAC submitter should notify the relevant EDMS Power Web User (Requestor) as to the name of the relevant Sydney Water Acceptance / Reliability Engineer, for EDMS WAC workflow routing selection.

All drawings prepared for Sydney Water shall conform to the requirements of this document.

The cost of correcting noncompliant drawings shall not be passed to Sydney Water.

2.1.1 Engineering Drawings Management System (EDMS)

The Engineering Drawings Management System (EDMS) is used to manage and store all Sydney Water’s WAC drawings and provides the one centralised application that is always accessible for easy management of:

- new drawing number allocations,
- updating/revising of existing WAC drawings
- submission of new WAC drawings for Sydney Water assets, etc.

Overview of EDMS:

Sydney Water’s EDMS Meridian system includes four modules for managing engineering drawings. Internal staff use Power Web for drawing workflows and project folder management, and Explorer Web for viewing and downloading PDF versions of drawings. The Internal Contractor Portal (iOCP) provides Sydney Water staff with read only access to view asset plans and access to project folders. The iOCP can also be accessed via Spatial Hub, Hydra and Maximo. External contractors use the External Contractor Portal (eOCP), which allows access to project drawings and requires registration using a company email. General users, whether internal or external use the relevant Contractor Portal to request project folder access, drawing numbers, and submit or update WAC drawings. All drawing updates and submissions follow a structured workflow managed by EDMS Power Web users. Refer to the appendix for a detailed information about each EDMS module and access requirements.

2.2 Drawing Requirements

2.2.1 Asset Register Requirements

Sydney Water's Technical Asset Register (TAR) requires all attribute information for assets being handed over to Sydney Water. For example, where pipes are constructed, a pipe schedule containing pipe size, material, type, class, length and joint type of all pipes laid with individual breakup e.g. DN 150, uPVC, ribbed wall, SN8, 6 m, RRJ. Where applicable, drawings are to comply with the most recent versions of WSAA Standards as seen in Appendix 1.

2.2.2 Drawing Numbers

The drawing number consists of two parts, Facility or Index Number and Plan Number. Both lines are either an alpha/numeric or numeric text string. The designer shall obtain the drawing numbers via accessing the EDMS Meridian Contractor Portal prior to commencing drawings to avoid back drafting and the resultant possibility of cross-referencing errors. The CAD file name and drawing numbers issued by EDMS shall not be changed under any circumstances.

2.2.3 Drawing File Name

The format of naming drawing files shall conform to that as specified by Sydney Water's EDMS. The drawing file naming convention shall be strictly adhered to. No variation shall be accepted, and it will be rejected by EDMS.

2.2.4 Drawing Format

All drawings prepared for Sydney Water shall be in AutoCAD drawing file format (dwg).

2.2.5 Equipment Drawings

All equipment manufacturer's drawings, vendor drawings and other similar type third party drawings need to be included in the maintenance documentation and submitted into EDMS or SWIM, Sydney Water's information repository at Sydney Water's discretion.

Equipment drawings are not required in the drawing set for off-the-shelf proprietary equipment. Such information shall be provided in the Operations and Maintenance Manual. Drawings for custom equipment (Vendor drawings) shall be included in the drawing set and comply with this document.

2.2.6 Drawing Sheet Size

The standard drawing size must be A1. The original drawing plot must be in A3 format and shall be legible in A3 format.

2.2.7 Drawing Environment

All drawings shall utilise the "paper space/model space" feature of AutoCAD. Under this environment, all structures and details must be created in "model space" at a scale of one to one (ie. in millimetres) and displayed in "paper space" using suitably scaled AutoCAD "Viewports".

Where the "paper space/model space" feature of AutoCAD is utilised, the dimensions, labels and annotation text associated with the details drawn, shall be scaled to suit and inserted in model space. However, the drawing

frame, general notes, reference drawing list, material list, pipework schedule and other general notation shall be inserted as "paper space" entities (created in Mtext format) at a scale of one to one on the drawing layout. To ensure AutoCAD references metric line types, pattern hatches, etc. the AutoCAD system variable "Measurement" shall be set to "1 ".

All linear reticulation infrastructure plans shall be projected in GDA2020 / MGA Zone 56.

2.2.8 Entity colour and line weights

The method of setting a drawing entity's colour and line weight, and hence the entity's plotted pen thickness, must be to set the AutoCAD entity "Colour" and "Lineweight" properties to "Bylayer" and AutoCAD entity "Plot style" property to "Bycolour".

For all drawings (except electrical), the following colours must be used to represent the various line weights or pen thicknesses for full size prints:

AutoCAD colour no.	Colour	Line weight
1	Red	0.5 mm (Plots Black)
2	Yellow	0.35 mm (Plots Black)
3	Green	1.4 mm (Plots Black)
4	Cyan	2.0 mm (Plots Black)
5	Blue	0.7 mm (Plots Black)
6	Magenta	1.0 mm (Plots Black)
7	White	0.25 mm (Plots Black)
8	Light Grey	0.18 mm (Plots Black)
10	Default Colour	0.25 mm (Plots by Colour)
11-19	Default Colour	0.25 mm (Plots by Colour)
20	Default Colour	0.25 mm (Plots by Colour)
21-29	Default Colour	0.25 mm (Plots Black)
30	Default Colour	0.25 mm (Plots by Colour)
31-39	Default Colour	0.25 mm (Plots Black)
40	Default Colour	0.25 mm (Plots by Colour)
41-49	Default Colour	0.25 mm (Plots Black)
50	Default Colour	0.25 mm (Plots by Colour)
51-59	Default Colour	0.25 mm (Plots Black)
60	Default Colour	0.25 mm (Plots by Colour)
61-69	Default Colour	0.25 mm (Plots Black)
70	Default Colour	0.25 mm (Plots by Colour)
71-79	Default Colour	0.25 mm (Plots Black)
80	Default Colour	0.25 mm (Plots by Colour)
81-89	Default Colour	0.25 mm (Plots Black)
90	Default Colour	0.25 mm (Plots by Colour)
91-99	Default Colour	0.25 mm (Plots Black)

AutoCAD colour no.	Colour	Line weight
100	Default Colour	0.25 mm (Plots by Colour)
101-109	Default Colour	0.25 mm (Plots Black)
110	Default Colour	0.25 mm (Plots by Colour)
111-119	Default Colour	0.25 mm (Plots Black)
120	Default Colour	0.25 mm (Plots by Colour)
121-129	Default Colour	0.25 mm (Plots Black)
130	Default Colour	0.25 mm (Plots by Colour)
131-139	Default Colour	0.25 mm (Plots Black)
140	Default Colour	0.25 mm (Plots by Colour)
141-149	Default Colour	0.25 mm (Plots Black)
150	Default Colour	0.25 mm (Plots by Colour)
151-159	Default Colour	0.25 mm (Plots Black)
160	Default Colour	0.25 mm (Plots by Colour)
161-169	Default Colour	0.25 mm (Plots Black)
170	Default Colour	0.25 mm (Plots by Colour)
171-179	Default Colour	0.25 mm (Plots Black)
180	Default Colour	0.25 mm (Plots by Colour)
181-189	Default Colour	0.25 mm (Plots Black)
190	Default Colour	0.25 mm (Plots by Colour)
191-199	Default Colour	0.25 mm (Plots Black)
200	Default Colour	0.25 mm (Plots by Colour)
201-209	Default Colour	0.25 mm (Plots Black)
210	Default Colour	0.25 mm (Plots by Colour)
211-219	Default Colour	0.25 mm (Plots Black)
220	Default Colour	0.25 mm (Plots by Colour)
221-229	Default Colour	0.25 mm (Plots Black)
230	Default Colour	0.25 mm (Plots by Colour)
231-239	Default Colour	0.25 mm (Plots Black)
240	Default Colour	0.25 mm (Plots by Colour)
241-249	Default Colour	0.25 mm (Plots Black)
250-254	Shades of Grey	0.25 mm (Plots by Colour)

The colours cyan, green and magenta must only be used where extra line thickness is required for emphasis.

Where the plotted drawing uses coloured line work, the colours selected shall be such that the line work depicted is clearly legible when the drawing is printed or copied on a monochrome (black and white) printer or copier in A3 size.

For electrical drawings the following colours must be used to represent the various pen weights or thicknesses for full size prints:

AutoCAD colour no.	Colour	Line weight
1	Red	0.5 mm
2	Yellow	0.35 mm
3	Green	0.25 mm
4	Cyan	0.25 mm
5	Blue	0.7 mm
6	Magenta	0.25 mm
7	White	0.25 mm
8	Light Grey	0.18 mm

2.2.9 Text Styles

Excluding measurement unit designations, all text shall be in uppercase. For general usage, the text style shall be AutoCAD ISOCP. The text style shall be defined as follows:

Style name	ISOCP
Font name	ISOCP.shx
Height	0
Width Factor	1.0
Obliquing Angle	0
Backwards	N
Upside - down	N
Vertical	N

It is recognised that occasions may arise where it is necessary to use other fonts. The practice will only be accepted when the desired result cannot be achieved using the ISOCP font. Where a substitute text font is used, the font shall be a standard AutoCAD text font and the associated text style name shall match the font name.

Text height, line weight and typical usage for drawing annotation shall be as follows:

Text Height	Line Weight	Typical Usage
3mm	0.35mm	General notes, labels, materials list, dimensions, etc
5mm	0.5mm	Minor view and section titles, minor headings etc
7mm	0.7mm	Major view and section titles, Major headings etc

2.2.10 Dimensioning Style

Dimensioning style shall be in accordance with Australian Standard AS 1100 and HB7: Engineering Drawing Handbook issued by Standards Australia in Section 3.2.

The standard drawing template will be available in EDMS.

2.2.11 Line Types

The layering convention for line types shall be as per Appendix 3 & 4 and shall be set using the AutoCAD "Linetype" property to "Bylayer". Drawings supplied utilising the AutoCAD "paper space/model space" feature shall have the AutoCAD system variables "Ltscale" and "Psltscale" set to "1 ". Electrical schematics, process and instrumentation drawings and other similar unscaled drawings which are supplied not using this feature shall have the AutoCAD system variable "Ltscale" set to match the scale of the drawing form.

AS1100 Designating Letter	Line Type	Typical Usage
E	Dash_1	Hidden outlines and edges
G	Chain_1	Centre-lines and axes of solids, path lines for indicating movement, features in front of cutting plane, etc
K	Chdbdash	Outlines of adjacent parts, Alternative and extreme position of movable parts, etc
-	Inst_line	Instrument lines in process and instrumentation diagrams
-	Reodash	Steel reinforcing mesh in section

Any customized line types, developed by the designer and used in the preparation of Sydney Water drawings, must be defined for use in metric drawings. (i.e. Line types designed for imperial drawings shall not be scaled to suit metric drawings) Entity colour and line weights.

The method of setting a drawing entity's colour and line weight, and hence the entity's plotted pen thickness, shall be to set the AutoCAD entity "Colour" and "Lineweight" properties to "Bylayer" and AutoCAD entity "Plot style" property to "Bycolour".For all drawings (except electrical), the following colours shall be used to represent the various line weights or pen thicknesses for full size prints:

AutoCAD Colour No.	Colour	Line Weight
1	Red	0.5mm
2	Yellow	0.35mm
3	Green	1.4mm
4	Cyan	2.0mm
5	Blue	0.7mm
6	Magenta	1.0mm
7	White	0.25mm
8	Light Grey	0.18mm

The colours cyan, green and magenta shall only be used where extra line thickness is required for emphasis.

For electrical drawings the following colours shall be used to represent the various pen weights or thicknesses for full size prints:

AutoCAD Colour No.	Colour	Line Weight
1	Red	0.5mm
2	Yellow	0.35mm
3	Green	0.25mm
4	Cyan	0.25mm
5	Blue	0.7mm
6	Magenta	0.25mm
7	White	0.25mm
8	Light Grey	0.18mm

The AutoCAD plot style tables provided in Appendix 3 and Appendix 4 shall be used to ensure compliance with the above.

2.2.12 Layering Structure

The standard layering convention shown in Appendix 3 shall be used for the preparation of all drawings (except electrical). The standard layering convention shown in Appendix 4 shall be used for electrical drawings.

It is recognised that the use of numeric fixed layer names, as required by the standard layering conventions, may not be feasible when drawings are generated by some third-party design packages. When this is the case, the appropriate standard layer number should prefix the layer name generated by the design package. For example, a layer generated by the design package named "pipe-dn450-123", which contains entities to be shown in 0.35 pen and dashed line, would be renamed to "51-pipe-dn450-123".

2.2.13 WAC Title Block Information

The following should be read in conjunction with Appendix 5, "Sample Title Block Layout". It is recommended to follow this convention for all stages of the drawing lifecycle.

The designer shall complete the standard title block for all design drawings as follows:

a) The drawing title shall include the work package or product/facility name and designation numbers and shall accurately describe the content of the drawing. AutoCAD attributes have been defined for four-line drawing title.

b) **Title 1**: is the Level 30 System Area location hierarchy identifier as shown in MAXIMO for the relevant Sydney Water product network/system (Wastewater, Water, Recycled Water, Stormwater) This is valid for both linear (pipeline) and facility assets drawings.

E.g. “Malabar Sewerage System Network” E.g. “Potts Hill Water Delivery System”

Please note, adhere to the current, approved procedure for creating a System Area in Maximo, where one has not already been established.

Title 2 for **Linear Assets**

Water or Recycled - Trunk main/Critical main name;
Wastewater - Name of Branch or Trunk/Carrier;
Reticulation Water Main
Stormwater – Name of Branch / Name of Subbranch

Title 2 for **Facility Assets** - Facility Number, Facility Name and the address, as per MAXIMO

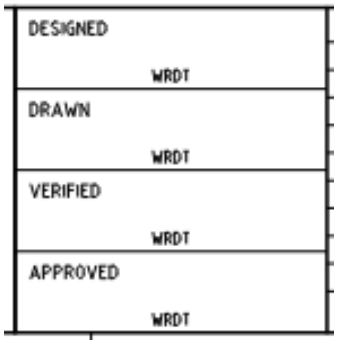
E.g. “SP0360 Menai River Woronora” (Sewerage Pumping Station)

Note: If a new facility is to be created related to your project drawings, then the MAXIMO facility asset number details need to be created before the new EDMS drawing numbers can be created. Refer to the MEPR 0038.02 Facility Number Request Form to request a new Facility number. To access this form, visit: https://swdelivery.com.au/reference/515.

c) The first initial, full surname and Company name shall be inserted into the appropriate fields in the "Designed" and "Drawn" signature boxes. The dates the WAC drawing was drawn shall be inserted in the appropriate field. The “Designed”, “Drawn”, “Verified” and “Approved” names are the persons responsible for updating the drawing at the WAC stage i.e. not the persons from the IFC or prior stages.

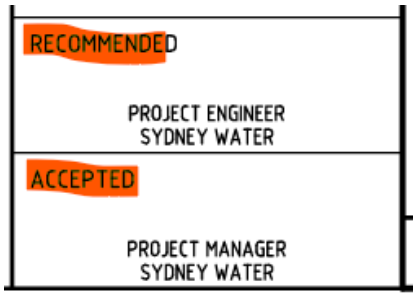
d) The first initial, full surname, Company name of the designer's engineer or representative who has verified the WAC drawing shall be inserted into the appropriate fields in the "Verified" signature box. The date the drawing was verified shall be inserted in the appropriate field.

e) The first initial, full surname, company name of the designer's representative who approved the WAC drawing for release to Sydney Water shall be inserted into the appropriate fields in the "Approved" signature box. The date the WAC drawing was approved shall be inserted in the appropriate field.



f) The designer’s full company logo, name, ABN, address, phone number, fax, e-mail address and website and Sydney Water consultant contract number must be added to the title block.

g) The first initial, full surname, position title of the Sydney Water representatives who have recommended the acceptance of and have accepted the WAC drawing content shall be inserted into the appropriate fields in the "Recommended" and “Accepted” signature boxes (where applicable). The date the WAC drawing was recommended shall be inserted in the appropriate field. **If the Draft WAC drawings are accepted, then the Contractor shall populate these fields with the details of the relevant Sydney Water Project Engineer and Project Manager, change the drawing status to issue and change the Revision. The revision should be “A” for the initial WAC drawing, or when an existing WAC drawing is revised, then the latest revision should be incremented by one character e.g. “B” to “C” prior to submitting WAC drawings to EDMS. If a ‘legacy’ WAC/WAE drawing version is numeric at the revised WAC stage, then instead of using letters, the WAE revision should be incremented by one e.g. if the WAC is 4 then the next revision should be 5.**



h) If the drawing to be produced supersedes another, a box has been provided above the "Recommended" box for the purpose of inserting the superseded drawing number. If the drawing does not supersede another, a dashed line shall be placed in the box provided.

i) Where known/assigned, the Sydney Water Project Number for the works depicted in the drawing shall be added in the appropriate box. This will be auto populated by EDMS.

j) The drawing Facility or Index Number and Plan Number as defined by EDMS and as supplied as part of the template by Sydney Water shall NOT be modified at any circumstances.

Note: EDMS Drawing Number = Facility or Index Number (Linear Assets) + Plan Number

k) For **Linear Assets:**

- **reticulation sized mains** should use EDMS drawing INDEX numbers of:
  - Water Reticulation: INDEX600
  - Wastewater Reticulation: INDEX601
  - Recycled water (all sized mains): INDEX602
- **distribution, trunkmain, carrier, major main sized mains** should use the other relevant listed INDEX numbers in the EDMS Meridian Contractor Portal "request new drawing numbers" selection panel drop downlists

l) Where required, a Sheet Number for the works depicted shall be inserted in the appropriate field.

Except for Linear Assets water (INDEX600), wastewater (INDEX601) and recycle water (INDEX602) Sheet Numbers will be shown as "Sheet 1" in EDMS, as the "Plan Number" is uniquely allocated in EDMS per drawing number, for all Facility and non-reticulation sized water and wastewater mains.

For Example: Water reticulation main – Plan Number "1234" – INDEX600:

- **Sheet 1** of 3: INDEX600_1234
- **Sheet 2** of 3: INDEX600_1234_**002**
- **Sheet 3** of 3: INDEX600_1234_**003**

2.2.14 Revision Status of WAC Drawings

a) The tittle block revision type shall reflect the current drawing stage.

b) The title block "Revision" field shall be set as follows:

- For the submission of first accepted WAC drawing into EDMS the field shall be set to Revision "A". Subsequent WAC amendments/updates to that WAC drawing, particularly those related to facility drawings, shall use the next consecutive alphabetical character (as recorded in EDMS) during the management of the asset lifecycle by Sydney Water, for that particular WAC drawing number.

If a 'legacy' WAC/WAE drawing version is numeric at the revised WAC stage, then instead of using letters, the WAE revision should be incremented by one e.g. if the WAC is 4 then the next revision should be 5.

- If there is insufficient space in the Details of Amendment Table then the bottom row shall be removed.

2.2.15 Amendments to Checked Out EDMS WAC Drawings

Amendments to WAC drawings will occur during the service life of the assets with Revision A being for the submission of first WAC drawing issued post construction, as submitted into EDMS. Any amendments shall be completed as follows:

a) For each amendment submitted after the first WAC drawing issue, the issue letter, a description of modifications to the drawing, initials of the designer's engineer or representative who has approved the modifications to the drawing and who takes professional responsibility for the modifications, and the date are to be inserted.

b) Amendment triangle/s or diamond/s, containing the draft number or issue letter, shall be placed adjacent to the modified sections of the drawing. For additional clarity, revision cloud/s may also be used to highlight current modifications. Any revision clouds, amendment triangle/s or diamond/s used to highlight previous modifications shall be removed.

c) Refer to 4.13 WAC Title Block Information for guidance relating to revision letters

2.2.16 Information Security and Access Restrictions

Any electronic drawing files provided to the designer by Sydney Water for use in preparation of the design and/or Work As Constructed (WAC) drawings shall remain the copyrighted property of Sydney Water and shall not be used for any purpose other than to assist in the preparation of the design and/or WAC drawings for the project(s) under contract. These drawings Shall Not be shared with a third party without a prior Sydney Water approval.

2.2.17 Use of external reference files

Externally referenced files promote coordination among different disciplines by making drawing information available simultaneously to different users. To assist in drawing preparation, where a major element within a project appears on more than one drawing, it may be drawn in a file that is attached to each drawing using the AutoCAD "Xref' command.

Drawings containing external references shall be considered as working drawings only and will not be accepted as WAC drawings. Prior to submission of work as constructed drawings to Sydney Water, all external references, imported images etc must be bound to individual drawings. **WAC *Drawings containing unbound external references, images etc. will not be accepted by Sydney Water.***

2.2.18 Use of multiple sheet layouts

The "paper space / model space" feature of AutoCAD enables the user to define multiple page "layouts" referencing the one "model". Each "layout" represents a separate drawing. This feature is often used when preparing drawings of similar discipline of facility (e.g. steelwork, pipework, etc.).

Drawing files containing multiple "layouts" shall be considered as working drawings only and will not be accepted as WAC drawings.

Prior to submission of work as constructed drawings to Sydney Water, all drawing files containing multiple "layouts" shall be divided into separate AutoCAD drawing files, for each file a new Plan number and drawing

number shall be requested from EDMS. Each AutoCAD drawing file shall contain only one AutoCAD drawing sheet "Layout".

3. Acceptance of WAC Drawings

The accepting project manager must assess and confirm that all assets are suitably constructed, and all relevant asset data is contained within WAC drawings as per Sydney Water design guidelines. Once accepted, the Work as Constructed drawings are to be loaded into EDMS as revision “A” (for the first submitted WAC drawing into EDMS).

4. Supply Of Work As Constructed Drawings

All Work-As-Constructed (WAC) drawings shall accurately reflect the works as constructed and installed.

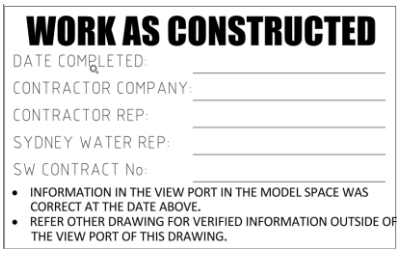
Preparation of WAC drawings shall conform to the following:

a) Prior to submission of WAC drawings, all drawing files shall be edited to remove all entities which are not part of the final construction. Details used in the development of the drawing, but which are not part of the final construction shall be removed. All drawings shall also be purged to remove all irrelevant blocks, layers, text styles, etc through use of the AutoCAD "Purge" command.

b) The WAC drawings shall also be checked for database errors using the AutoCAD "Audit" command and any encryption, credentials removed

c) The AutoCAD files used, as the basis for preparation of all WAC drawings, shall be the final issue of the construction drawings and have accurately captured all the amendments including changes during construction. Red line versions of IFC drawings will not be accepted as WAC drawings.

d) A dated electronic certificate in the form of an AutoCAD "Block" shall be added to each drawing. As a minimum, the certificate shall be headed "WORK AS CONSTRUCTED", give the date the WAC drawing is finalised by the contractor / installer (Not the date of the red line or field inspection), the constructor's / installer's Company name, the name of the constructor's / installer's representative, the name of the Sydney Water Representative (i.e. the Project Manager) and the Sydney Water Contract Number (if applicable). Information contained in the electronic certificate should not contradict the logic of the drawing’s progression e.g. the electronic certificate on the WAC drawing shall be the same date or later than the date it was drawn as seen in the title block.



e) In the drawing title block, the drawing "Issue" letter of each drawing shall be “A” and can only be changed to the next available letter by Sydney Water during the management of the asset.

f) If a revision is made to an existing WAC drawing then the letter should be the next consecutive letter in the alphabet. If the existing WAC drawing “issue” symbol is a number instead of a letter, then use the next consecutive number.

g) An entry with the "Description" stating "Work As Constructed" shall be added to the drawing amendment table of each drawing. Where major deviations from the final design drawings have been made, the description shall also briefly describe or list the modifications made.

h) Each drawing shall be modified wherever changes to the final detail design have been made. Amendment triangle/s or diamond/s, containing the issue letter, shall be placed adjacent to the modified section/s of the drawing. For additional clarity, revision cloud/s may also be used to highlight the modifications. Any revision clouds, amendment triangle/s or diamond/s used to highlight previous modifications shall be removed.

i) Any additional drawings or sketches prepared by the constructor / installer to detail WAC information shall conform to this document. The new sketch or drawing will require a drawing number issued by Sydney Water's EDMS in accordance with Section 2.2.2 and shall be referenced as necessary to the relevant parent drawings.

Once accepted by the Sydney Water Project Engineer & Project Manager, update revision status information as per Section 2.2.14 and submit to EDMS.

Appendix

Appendix 1 References and standards

All drawings submitted to Sydney Water must comply with the most recent revision of the following standards:

Document reference	Document tittle
80000-1:2022	The International System of Quantities and Units (SI)
AS 1100.101	Technical Drawings – General Principles
AS 1100.201	Technical Drawings – Mechanical Engineering Drawing
AS 1100-301	Technical Drawings – Architectural Drawing
AS 1100-401	Technical Drawings – Engineering Survey and Engineering Survey Design drawing
AS/NZS 1100-501	Technical Drawings – Structural Engineering Drawing
AS 1101.1	Graphical symbols for general engineering - Hydraulic and pneumatic systems
AS 1101.2	Graphical symbols for general engineering - Welding and non-destructive examination
AS 1101.3	Graphical symbols for general engineering - Welding and non-destructive examination
AS 1101.4	Graphical symbols for general engineering - Machine elements
AS 1101.5	Graphical symbols for general engineering - Piping, ducting and mechanical services for buildings
AS 1101.6	Graphical symbols for general engineering - Process measurement control functions and instrumentation
ISO 3511	Industrial process measurement control functions and instrumentation -- Symbolic representation
AS 1102	Graphical symbols for electro technology - **Parts 101-113 and 12**
AS 2067	Substation and high voltage installation exceeding 1 kV AC
AS/NZS 3000	Electrical installations (known as the Australian/New Zealand Wiring Rules)
AS 4799	Installation of underground utility services and pipelines within railway boundaries
AS 5488	Classification of Subsurface Utility Information (SUI)
HB 7-1993 (R2014)	Engineering Drawing Handbook issued by Standards Australia
ISO 7000:2019	Graphical Symbols for use on Equipment
AS 1654.1	ISO system of limits and fits - Bases of tolerances, deviations and fits
AS 1654.2	ISO system of limits and fits - Tables of standard tolerance grades and limit deviations for holes and shafts
AS 3702	Item designation in electrotechnology
WSA 01-2004-3.1	Polyethylene Pipeline Code
WSA 02-2002-2.2	Sewerage Code SW Water Ed. 1 Ver.4
WSA 03-2011-3.1	Water Supply Code (SW Ed 2014)
WSA 04:2005-2.1	Sewage Pumping Station Code SW Ed. 2012
WSA 06-2008-1.3	Vacuum Sewerage Code of Australia

WSA 07-2007-1.1	Pressure Sewerage Code of Australia
AS 60417	Graphical symbols for use on equipment

Appendix 2 Sydney Water reference and source documents

Document reference	Document Title
ACP0055	Asset Numbering Standard Operating Procedure
CPDMS0023	Sydney Water Technical Specification - Civil
BMIS0209	Sydney Water Technical Specification - Mechanical
CPDMS0022	Sydney Water Technical Specification - Electrical
HSS0009	Sydney Water Instrumentation and Control Standards TOG_TS01
D0001440	Sydney Water Technical Specification - Commissioning
D0001441	Sydney Water Technical Specification - Maintenance
1041412	Management Specification – Major Projects
PD-STD-001	Program Delivery - Management Specification
D000724	Treatment Plant SCADA Standards
AMQ0479.01	Sydney Water Treatment Facility Process Codes
D0002554	Specification – preparation of work as constructed (WAC) drawings
3174889	Checklist – submission requirements for WAC plan

Appendix 3 Layering convention for CAD drawings (general)

Layer No.	Pen Thickness	Entity Colour	Usage
DEFPOINTS	N/A	WHITE	VIEWPORT FRAMES
10	0.7	BLUE	SOLID LINES, ARCS, ETC.
11	0.7	BLUE	DASHED LINES, ARCS, ETC.
12	0.7	BLUE	CENTRE LINES, ARCS, ETC.
13	0.7	BLUE	OTHER LINES, ARCS, ETC.
14	0.7	BLUE	DIMENSIONS
15	0.7	BLUE	BLOCK INSERTIONS
16	0.7	BLUE	INSTRUMENT LINES
17	0.7	BLUE	TEXT
18-27	0.7	BLUE	ANY OTHER 0.7mm LINE WORK
30	0.5	RED	SOLID LINES, ARCS, ETC.
31	0.5	RED	DASHED LINES, ARCS, ETC.
32	0.5	RED	CENTRE LINES, ARCS, ETC.
33	0.5	RED	OTHER LINES, ARCS, ETC.
34	0.5	RED	DIMENSIONS
35	0.5	RED	BLOCK INSERTIONS
36	0.5	RED	INSTRUMENT LINES
37	0.5	RED	TEXT
38 - 49	0.5	RED	ANY OTHER 0.5mm LINE WORK
50	0.35	YELLOW	SOLID LINES, ARCS, ETC.
51	0.35	YELLOW	DASHED LINES, ARCS, ETC.
52	0.35	YELLOW	CENTRE LINES, ARCS, ETC.
53	0.35	YELLOW	OTHER LINES, ARCS, ETC
54	0.35	YELLOW	DIMENSIONS
55	0.35	YELLOW	BLOCK INSERTIONS
56	0.35	YELLOW	INSTRUMENT LINES
57	0.35	YELLOW	TEXT
58 - 69	0.35	YELLOW	ANY OTHER 0.35mm LINE WORK
70	0.25	WHITE	SOLID LINES, ARCS, ETC
71	0.25	WHITE	DASHED LINES, ARCS, ETC
72	0.25	WHITE	CENTRE LINES, ARCS, ETC
73	0.25	WHITE	OTHER LINES, ARCS, ETC
74	0.25	WHITE	DIMENSIONS
75	0.25	WHITE	BLOCK INSERTIONS
76	0.25	WHITE	INSTRUMENT LINES

Layer No.	Pen Thickness	Entity Colour	Usage
77	0.25	WHITE	TEXT
78 - 89	0.25	WHITE	ANY OTHER 0.25mm LINE WORK
90	0.18	GREY COLOUR 8	SOLID LINES, ARCS, ETC.
91	0.18	GREY COLOUR 8	DASHED LINES, ARCS, ETC.
92	0.18	GREY COLOUR 8	CENTRE LINES, ARCS, ETC.
93	0.18	GREY COLOUR 8	OTHER LINES, ARCS, ETC
94	0.18	GREY COLOUR 8	DIMENSIONS
95	0.18	GREY COLOUR 8	BLOCK INSERTIONS
96	0.18	GREY COLOUR 8	INSTRUMENT LINES
97	0.18	GREY COLOUR 8	TEXT
98 - 109	0.18	GREY COLOUR 8	ANY OTHER 0.18mm LINE WORK
110	1.0	MAGENTA	SOLID LINES, ARCS, ETC.
111	1.0	MAGENTA	DASHED LINES, ARCS, ETC.
112	1.0	MAGENTA	CENTRE LINES, ARCS, ETC.
113	1.0	MAGENTA	OTHER LINES, ARCS, ETC.
1 14	1.0	MAGENTA	DIMENSIONS
1 15	1.0	MAGENTA	BLOCK INSERTIONS
1 16	1.0	MAGENTA	INSTRUMENT LINES
1 17	1.0	MAGENTA	TEXT
1 18-129	1.0	MAGENTA	ANY OTHER 1.0mm LINE WORK
130	1.4	GREEN	SOLID LINES, ARCS, ETC.
131	1.4	GREEN	DASHED LINES, ARCS, ETC.
132	1.4	GREEN	CENTRE LINES, ARCS, ETC.
133	1.4	GREEN	OTHER LINES, ARCS, ETC.
134	1.4	GREEN	DIMENSIONS
135	1.4	GREEN	BLOCK INSERTIONS
136	1.4	GREEN	INSTRUMENT LINES
137	1.4	GREEN	TEXT
138-149	1.4	GREEN	ANY OTHER 1.4mm LINE WORK
150	2.0	CYAN	SOLID LINES, ARCS, ETC.
151	2.0	CYAN	DASHED LINES, ARCS, ETC.
152	2.0	CYAN	CENTRE LINES, ARCS, ETC.
153	2.0	CYAN	OTHER LINES, ARCS, ETC.
154	2.0	CYAN	DIMENSIONS
155	2.0	CYAN	BLOCK INSERTIONS
156	2.0	CYAN	INSTRUMENT LINES

Layer No.	Pen Thickness	Entity Colour	Usage
157	2.0	CYAN	TEXT
157-169	2.0	CYAN	ANY OTHER 2.0mm LINE WORK

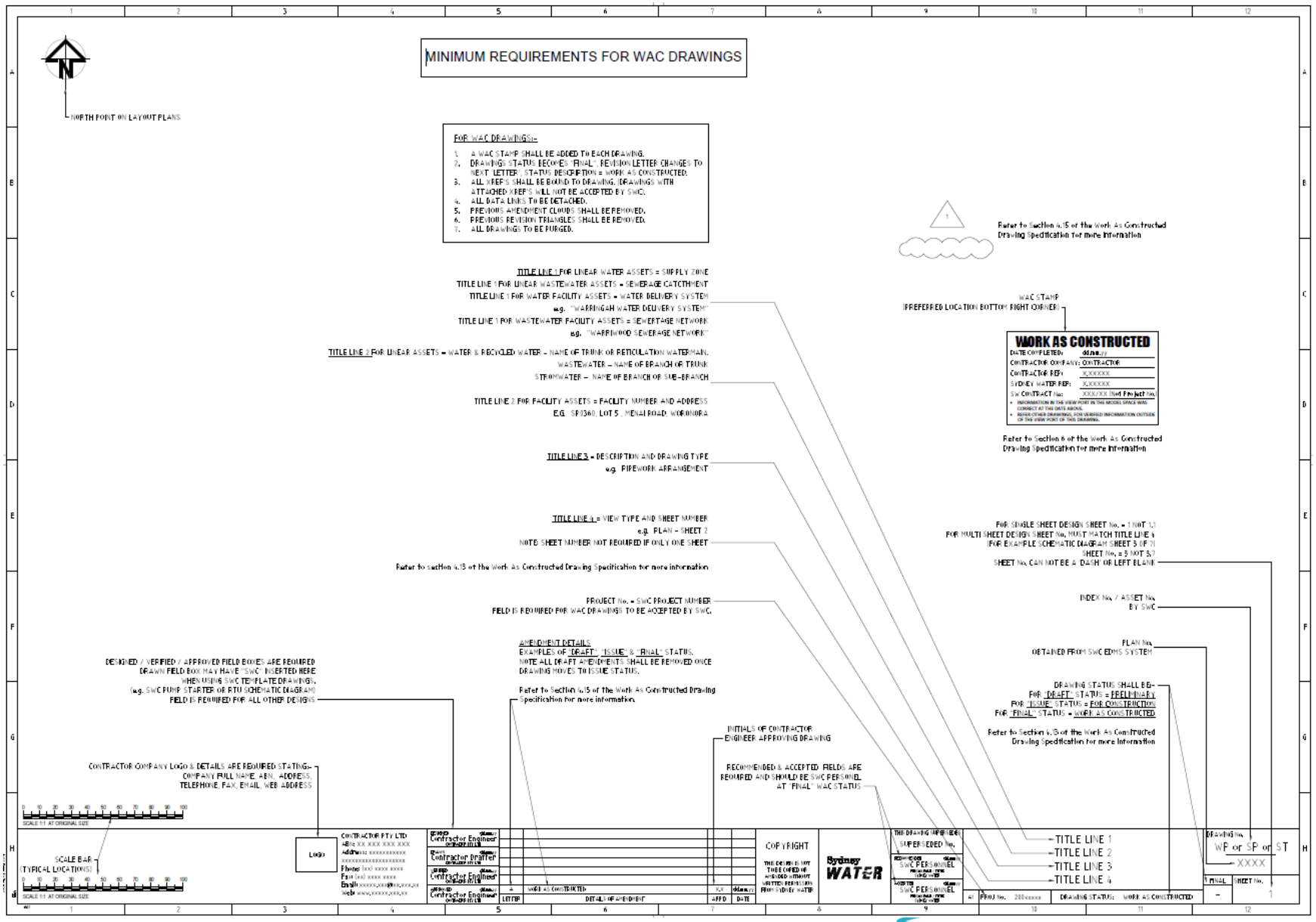
Appendix 4 Layering Convention for CAD Drawings (Electrical)

LAYER No	A3 LINE WEIGHT	A1 LINE WEIGHT	COLOUR	DESCRIPTION	LINE TYPE	USED FOR	COMMENTS
DEFPOINTS	N/A	N/A	WHITE	VIEWPORT FRAMES	CONTINUOUS		
0	N/A	N/A	WHITE	ALL GA BLOCK INTERNALS	AS REQUIRED		
2	0.125	0.25	CYAN	SOLID LINES, ARCS, ETC.	CONTINUOUS		
3	0.125	0.25	GREEN	SOLID LINES, ARCS, ETC.	CONTINUOUS		
5	0.125	0.25	MAGENTA	SOLID LINES, ARCS, ETC.	CONTINUOUS	REVESION CLOUDS	DO WE WANT TO USE FOR REVISION CLOUDS?? CURRENTLY USING "CLOUD" LAYER WHICH ISN'T DEFINED
6	0.125	0.25	MAGENTA	SOLID LINES, ARCS, ETC.	CONTINUOUS		
10	0.35	0.7	BLUE	SOLID LINES, ARCS, ETC.	CONTINUOUS		SEEMS NOT NEEDED AS LAYER 15 AVAILABLE
11	0.35	0.7	BLUE	DASHED LINES, ARCS, ETC.	DASH_1		
12	0.35	0.7	BLUE	CENTRE LINES, ARCS, ETC.	CHAIN_1		
14	0.35	0.7	BLUE	OTHER LINES, ARCS, ETC.	CONTINUOUS		
15	0.35	0.7	BLUE	SOLID LINES, ARCS, ETC.	CONTINUOUS	LV WIRING	
19	0.35	0.7	BLUE	INSTRUMENT LINES	CONTINUOUS		
21	0.05	0.05	160	GENERAL ARRANGEMENTS	CONTINUOUS		COULD FOLLOW 11 TO 15 LINE TYPES BUT WITH REDUCED LINEWEIGHTS FOR GA'S?
22-27	0.35	0.7	BLUE	ANY OTHER 0.35/0.7mm LINE WORK	AS REQUIRED		COULD BE LEFT OFF FOR NOW AND ADDED AT LATER REVISIONS IF REQUIRED
28	0.35	0.7	BLUE	TEXT	CONTINUOUS		
31	0.25	0.5	RED	DASHED LINES, ARCS, ETC.	DASH_1		
32	0.25	0.5	RED	CENTRE LINES, ARCS, ETC.	CHAIN_1	SCHEMATIC	

LAYER No	A3 LINE WEIGHT	A1 LINE WEIGHT	COLOUR	DESCRIPTION	LINE TYPE	USED FOR	COMMENTS
						EQUIPMENT BORDERS	
34	0.25	0.5	RED	OTHER LINES, ARCS, ETC.	CONTINUOUS		
35	0.25	0.5	RED	SOLID LINES, ARCS, ETC.	CONTINUOUS	SCHEMATIC COMPONENTS, RELAYS, LAMPS etc.	
39	0.25	0.5	RED	INSTRUMENT LINES	CONTINUOUS		
41	0.05	0.05	10	GENERAL ARRANGEMENTS	CONTINUOUS	GA COMPONENTS, CABLE DUCT, ENCLOSURE, TEXT etc.	COULD FOLLOW 31 TO 35 LINE TYPES BUT WITH REDUCED LINEWEIGHTS FOR GA'S?
42-47	0.25	0.5	RED	ANY OTHER 0.25/0.5mm LINE WORK	AS REQUIRED		COULD BE LEFT OFF FOR NOW AND ADDED AT LATER REVISIONS IF REQUIRED
48	0.25	0.5	RED	TEXT	CONTINUOUS		
51	0.175	0.35	YELLOW	DASHED LINES, ARCS, ETC.	DASH_1	SCHEMATIC/LOOP DIAGRAM TERMINAL GROUPINGS	
52	0.175	0.35	YELLOW	CENTRE LINES, ARCS, ETC.	CHAIN_1		
54	0.175	0.35	YELLOW	OTHER LINES, ARCS, ETC.	CONTINUOUS		
55	0.175	0.35	YELLOW	SOLID LINES, ARCS, ETC.	CONTINUOUS	SCHEMATIC ELV / CONTROL WIRING, TERMINALS etc.	
59	0.175	0.35	YELLOW	INSTRUMENT LINES	CONTINUOUS		
61	0.05	0.05	50	GENERAL ARRANGEMENTS	CONTINUOUS	GA COMPONENTS, CABLE DUCT, ENCLOSURE, TEXT etc.	COULD FOLLOW 51 TO 55 LINE TYPES BUT WITH 0.05 LINEWEIGHTS FOR GA'S?

LAYER No	A3 LINE WEIGHT	A1 LINE WEIGHT	COLOUR	DESCRIPTION	LINE TYPE	USED FOR	COMMENTS
62-67	0.175	0.35	YELLOW	ANY OTHER 0.175/0.35mm LINE WORK	AS REQUIRED		COULD BE LEFT OFF FOR NOW AND ADDED AT LATER REVISIONS IF REQUIRED
68	0.175	0.35	YELLOW	TEXT	CONTINUOUS		
71	0.125	0.25	WHITE	DASHED LINES, ARCS, ETC.	DASH_1		
72	0.125	0.25	WHITE	CENTRE LINES, ARCS, ETC.	CHAIN_1		
74	0.125	0.25	WHITE	OTHER LINES, ARCS, ETC.	CONTINUOUS		
75	0.125	0.25	WHITE	SOLID LINES, ARCS, ETC.	CONTINUOUS		
77	0.125	0.25	WHITE	DIMENSIONS, LEADERS, ETC.	CONTINUOUS		
78	0.125	0.25	WHITE	BLOCK INSERTIONS	CONTINUOUS	TITLEBLOCK, REVIONS, WAC STAMP, REV TRIANGLE, SPTE01 STAMP etc.	
79	0.125	0.25	WHITE	INSTRUMENT LINES	CONTINUOUS		
80	0.125	0.25	WHITE	WIRE / CABLE NUMBERS	CONTINUOUS		
81	0.05	0.05	255	GENERAL ARRANGEMENTS	CONTINUOUS	GA GEARPLATE, TERMINALS, LABELS, TEXT etc.	COULD FOLLOW 71 TO 75 LINE TYPES BUT WITH 0.05 LINEWEIGHTS FOR GA'S?
82-87	0.125	0.25	WHITE	ANY OTHER 0.125/0.25mm LINE WORK	AS REQUIRED		COULD BE LEFT OFF FOR NOW AND ADDED AT LATER REVISIONS IF REQUIRED
88	0.125	0.25	WHITE	TEXT	CONTINUOUS		

Appendix 5 Sample Title Block Layout



Appendix 6 CAD Template Requirements

The standard drawing template file issued by EDMS must be used for the preparation of new drawings . Template files should be downloaded from EDMS after the new drawing number has been issued. The standard drawing template files contain layer definitions, text and dimension style definitions and the standard drawing sheet frame and title block.

The drawing frame must not be renamed or “Exploded”. The title block contains variable fields, defined using AutoCAD “Attributes” for information input. The fields must be completed as per Section 2.2.13 of this document.

Appendix 7 EDMS Module Information

The **EDMS Meridian applications** have four different interfaces/modules, including:

- **EDMS Meridian Power Web** (Engineering Drawings (Master) + Projects) – resides on the Sydney Water IT Network
  - Used for EDMS WAC drawings workflow initiation and workflow management, administration, Project folders creation, downloading copy of native WAC drawings to Projects vault (for general users use), etc
  - (SW USERID and SW email required)
- **EDMS Meridian Explorer Web** (Engineering Drawings (Master) – Viewer Only access)
  - resides on the Sydney Water IT Network (SW USERID required)
  - used for searching, printing, downloading of WAC drawings pdf renditions (only) from master vault
- **EDMS Meridian Internal Contractor Portal** (*commonly known as **iOCP***) – resides on the Sydney Water IT Network
  - Allows viewer access to Engineering Drawings (Master) & Projects vaults (SW USERID required)
  - Allows access link "view asset plans" from Spatial Hub (HYDRA) & MAXIMO for existing WAC drawings
- **EDMS Meridian External Contractor Portal** (*commonly known as **eOCP***) – does **not** reside on the Sydney Water Network. Uses your Parent Company email address for self-registration access requests and subsequent log-in requirements. *Your Sydney Water contact representative (e.g. Project Engineer or Project/Contract Manager, can provide contractors details for eOCP access requirements.*
  - Allows for access to Projects vault drawings and is the general user access EDMS module for Contractors
- ***OCP*** stands for "Onset Contractor Portal". "Onset Design" is the software vendor and "Meridian" is the software product name.
- The general users of EDMS will use **Meridian Contractor Portal** (eOCP (for Contractors) or iOCP (for Sydney Water Staff) to perform the following tasks:
- Request access rights to their EDMS Project(s) folders (for project/contract related drawings)
- Request new Sydney Water drawing numbers
- Access to the new drawings for allocated projects
- Access to copy of previously downloaded native format WAC drawings for their allocated project. NB: An EDMS Power Web User needs to be requested to download "copy and lock" a copy of any existing WAC drawings that are required to be updated for proposed works to the existing assets
- Download copy of native files from their allocated project(s) for AutoCad drawing updates
- Submit WAC drawing(s) "book-in" requests + metadata CSV book-in register as a zip file for allocated project(s)