PRINCIPAL ENGINEER'S AMENDMENT TO STD-SPE-G-018 ISSUE 3

AMENDMENT TO STD-SPE-G-018 ISSUE 3 – DESIGN STANDARDS, STANDARD SPECIFICATION DRAFTING

Background

Icon Water specification *STD-SPE-G-018 Design Standards, Standard Specification Drafting* (Issue 3) was issued in 2016 for projects executed by Icon Water (or by others on behalf of Icon Water). As at the time of writing this amendment, Icon Water has updated its Design and Construction Standards with the aims of (i) improving how parties such as developers, designers and constructors interact with Icon Water and (ii) improving design and construction outcomes.

Icon Water's new Water Supply and Sewerage Design and Constructions Standards (which relate specifically to assets provided by developers on behalf of Icon Water) have an issue date of 2 July 2018. Icon Water's drafting requirements have been updated (via this amendment) to coincide with this issue date. This amendment has been issued as there was insufficient time to conduct a major upgrade of Icon Water's existing drafting requirements even though it has been recognised by many parties that this is required. It is expected that such a major upgrade will occur in the second half of 2018 once feedback has been obtained from the relevant parties on what Icon Water's future drafting requirements should be.

Purpose and Scope

The purpose of this amendment is to modify *STD-SPE-G-018 Design Standards, Standard Specification Drafting* (Issue 3) so that it can be used in-conjunction with Icon Water's new Design & Construction Standards which specifically relate to developer provided assets as per the process detailed in *STD-SPE-G-019 Developer Provided Assets – Water Supply and Sewerage – Asset Creation and Acceptance Process*.

The details provided in this amendment shall take precedence over the requirements detailed in *STD-SPE-G-018 Design Standards, Standard Specification Drafting* (Issue 3) for **developer provided assets only**. For projects executed directly for Icon Water as part of Icon Water's Ipad process, this amendment shall not apply.

Referenced Documents

This amendment shall be read and complied with in-conjunction with the following Icon Water documents:

- *STD-SPE-C-001 Technical Specification, Civil and Structural Works*
- *STD-SPE-C-004 Technical Specification, Survey and Tolerancing Requirements*
- *STD-SPE-G-018 Design Standards, Standard Specification Drafting (Issue 3)*
- *STD-SPE-G-019 Developer Provided Assets – Water Supply and Sewerage – Asset Creation and Acceptance Process*
- *SD Series Drawings*
- *Any other document referenced by the above-mentioned Icon Water documents.*

Amendments

The following table details amendments to *STD-SPE-G-018 Design Standards, Standard Specification Drafting* Issue 3 that must be complied with by all developers and their authorised agents (such as but not limited to designers, surveyors, specifiers and constructors) for developer-provided water supply and sewerage network asset drawings.

Note: The term "contractor" (as detailed in the table below) shall be taken to mean any party who is producing drawing(s) which describe assets which will be provided by developers for Icon Water.

Item	Amendments (for Developer Provided Asset Drawings)
1	**Drawing Submissions** All drawing submissions (e.g. "Design Submission 1", "Design Submission 2" and the final "WAE Submission") shall be provided electronically in both native (".dwg") format as well as PDF format. Native format (".dwg") drawings shall be compatible with AutoCAD 2013 and if any XRefs are included they shall be "bound". Note: Post 2 July 2018, Icon Water no longer has a requirement for drawing submissions to be in hardcopy format.
2	**Drawing Setup** For developer provided assets, AutoCAD drawing files may be setup in accordance with the contractor's own drafting standards on the proviso that: • The requirements of (i) *AS 1100 Technical drawing set*, and (ii) Icon Water's *SD Series* drawings are fully complied with. • For plans (e.g. Master Plans) the drawing is referenced from map grid coordinates (e.g. ACT Standard Grid) and not from AutoCAD's default "0, 0" arbitrary X, Y coordinate system. • Drawing title blocks show: o The name of the development o The name of the developer o The name of the agent (e.g. Consulting Engineer) o A revision block inclusive of dates o Revision marks o Scale bar(s) • Subdivision Layout Sheets show: o A North Point o ACT Standard Grid coordinates at 100 metre intervals o The road kerb and type of kerb or pavement edge layout o The pavement type (including footpaths) o Block boundaries o Section and block numbers o Existing surface contours at 0.5 metres o Final surface contours at 0.5 metres **Note**: *SD Series* drawings 1100 – 1199 depict such requirements which include: linetypes, line-weights, colours, icons, symbols and scales etc.
3	**The Use of Greyscales** Greyscales may be used for secondary features such as contour lines.

Item	Amendments (for Developer Provided Asset Drawings)
4	**Drawing Numbers** The contractor is free to issue drawing numbers in accordance with their own drafting standards except for projects deemed to be "Major Works – Complex". For "Major Works – Complex", the contractor shall submit a drawing register to Icon Water (ideally) prior to commencing design activities but notwithstanding this, prior to Design Submission 2 so that Icon Water drawing numbers can be issued.
5	**Drawing Stamps and Drawing Status** Contractors shall not stamp or otherwise show a drawing status as "Issued For Construction" or words to that effect unless written acceptance of all details shown on that drawing has previously been received from Icon Water. Contractors shall not stamp or otherwise show a drawing status as "Work As Executed" or words to that effect unless a Qualified Surveyor has performed a survey in accordance with Icon Water specifications *STD-SPE-C-001 Technical Specification – Civil and Structural Works* and/or *STD-SPE-C-004 Technical Specification – Survey and Tolerancing Requirements* as applicable.
6	**Requirements for Design Submission 1 (Master Plan) – Water Supply** The Water Supply Master Plan to be submitted for approval shall comply with the following requirements and inclusions: • A1 sheet size to be used (and PDF files shall be setup for A1 not A3). • Scale of 1:2500 • Road and block layout • Block and section numbers (if available) • Street names (if available) • Contours at 2.0 metre intervals • ACT Standard Grid coordinates and North Point orientated up the sheet • Land use other than "standard detached housing" (ref: Table IW.1 of *STD-SPE-G-012*) • Proposed water mains with sizes and positions of all valves, hydrants, water sample points, district water meters and pressure monitoring points • Fire risk categories where other than F6 (ref: Table IW.2 of *STD-SPE-G-012*) • Zone boundaries (if any) • Existing mains feeding the area • Existing and required easements (if any)
7	**Requirements for Design Submission 1 (Master Plan) – Sewerage** The Developer's Sewerage Master Plan to be submitted for approval shall comply with the following requirements and inclusions: • A1 sheet size to be used (and PDF files shall be setup for A1 not A3) • Scale of 1:1000 • Road and block layout • Block and section numbers (if available) • Street names (if available) • Contours at 0.5 metre intervals; every 5th contour shall display the contour value

<table>
<tr><th>Item</th><th>Amendments (for Developer Provided Asset Drawings)</th></tr>
<tr><td></td><td>

ACT Standard Grid coordinates (on a 500 metre grid) and North Point orientated up the sheet; and a vertical (height) datum reference to AHD
Existing and required easements (if any)
Existing sewer mains with surveyed invert levels at connection points and other trunk services
Expected rate of load build-up for key components such as sewage pumping stations, rising mains, vortex drops and syphons
Land use other than “Residential Low Density” (ref: Table IW.1 of STD-SPE-G-011) shall be clearly shown with abbreviations in compliance with the following table:

<table>
<tr><th>Abbreviation</th><th>Description</th></tr>
<tr><td>OS</td><td>Open space</td></tr>
<tr><td>MDR</td><td>Medium density residential</td></tr>
<tr><td>HDR</td><td>High density residential</td></tr>
<tr><td>C</td><td>Commercial</td></tr>
<tr><td>I</td><td>Industrial</td></tr>
<tr><td>INST</td><td>Institutional</td></tr>
<tr><td>SU</td><td>Special use</td></tr>
</table>

Each block (other than “Residential Low Density” shall reflect its EP contribution and any other data which would be necessary to derive this EP contribution
Q_1, Q_2 and Q_{100} (i.e. 1 year, 2 year and 100 year floods) for any streams, lakes or ponds in close proximity to the proposed sewers
Proposed sewer mains and maintenance hole locations. For all sewers regardless of size, the following information shall be shown:

the size
critical levels (defined at points where sewers cross other major services such as water mains, stormwater pipes, floodways and roadways)
the grade

Catchment boundaries where appropriate following block boundaries
All Collection Nodes[Note 1] displaying total contributing:
Equivalent Persons (EP)
Net Sewered Area
Peak Wet Weather Flow (which is taken to be the Design Flow)[Note 2]

<u>Note 1</u>: A Collection Node is defined as a point on a sewer pipe immediately upstream of a junction of two or more sewer pipes, where the catchment load contribution to that pipe exceeds 100 EP. A node shall be provided for each sub-catchment. Sub-catchment size shall not exceed 100 EP.

<u>Note 2</u>: All drawings shall reference the formula used for the Peak Wet Weather Flow (i.e. the Design Flow) calculations. Any assumptions or values used which are not in accordance with STD-SPE-G-011 shall be shown on the drawings.
</td></tr>
</table>

Item	Amendments (for Developer Provided Asset Drawings)
	If a sewage pumping station is proposed, additional drawing and design (e.g. Safety-in-Design) requirements apply in accordance with *STD-SPE-G-010* and *STD-SPE-G-019*. Contact Icon Water as early as possible in the planning process, and prior to Design Submission 1, to determine Icon Water's latest requirements. However, as a minimum, the following drawings shall be planned for at Design Submission 1 unless otherwise advised by Icon Water: • Locality Plan and Drawing List • General Notes • Table of: ADWF, PDWF, PWWF, Operating Levels, Pump Starts per Hour, On/Off time for all stages of the proposed development as well as how these parameters have been arrived at • Longitudinal section of incoming gravity main of sufficient length to be able to determine surcharge levels • Piping & Instrumentation Diagram • Hydraulic Profile • General Arrangement, Plan • General Arrangement, Sections • Site Plan (with truck turning movements) • Wet Well and Valve Chamber Pipework, Plan • Wet Well and Valve Chamber Pipework, Sections • Emergency Storage Structure Concrete, Base and Roof Plans • Collection Maintenance Hole, Plan and Sections • Pump Characteristic Curve & Rising Main System Curves (Cut-In, Cut-Out and Station Flooded) • Rising Main – Locality Plan and Drawing List • Rising Main – General Notes • Rising Main – Overall Layout Plan • Rising Main Layout Plan and Longitudinal Section (Multiple Sheets)
8	**Requirements for Design Submission 2 (Detailed Design) – Water Supply** The Developer's Detailed Design shall include all details provided at Design Submission 1. Additionally, the following requirements and inclusions also must be complied with: • A key drawing of all hydraulic assets (at a scale of 1:1000 at A1) showing: o the layout of reticulation o street names, block and section numbers, easement locations o positions of fittings, valves, hydrants, water sampling points, district water meters, pressure monitoring points, pressure zone boundaries, o drawing numbers and titles included in the set (including any Icon Water "-D" drawings that have been referenced in the set) o boundaries of the areas covered by each 1:500 scale detailed drawing (see next point) • Detail drawings (at a scale of 1:500 at A1) with contours at 0.5 metres showing: o A detailed layout of reticulation including the offset from the block boundary, o Pipe nominal diameter (DN), length of mains, pipe material, pipe class/PN, details of fittings o Positions of scour stops, valves and hydrants, water sampling points, district water meters, pressure monitoring points, reducing valve stations and pressure zone boundaries

Item	Amendments (for Developer Provided Asset Drawings)
	o The layout of roads and blocks showing the connection points of services • Longitudinal sections showing: o Depths of excavation o Provision for air release and drainage o Locations where the hydraulic design has been the responsibility of the Developer o A plot of the Hydraulic Grade Line for all: bulk supply mains; other sections of main which run across country, including those between reservoirs and built-up areas; other sections of main which are not to be fitted with service branch connections at normal urban subdivision intervals; other sections of main where specified by Icon Water. • A small-scale drawing showing the relationship of the project with the larger area of the whole pressure zone development plan • Larger-scale drawings with details of special anchorages, pressure reducing valve installations and isolation valve chambers
9	**Requirements for Design Submission 2 (Detailed Design) – Sewerage** The Developer's Detailed Design shall include all details provided at Design Submission 1. Additionally, the following requirements and inclusions must also be complied with: • A key drawing of all hydraulic assets (at a scale of 1:1000 at A1) showing: o Pipe system layout o Location of maintenance holes, maintenance shafts and rodding points o Location of any special structures such as but not limited to pump stations, engineered drop structures and vents o Q_1, Q_2 and Q_{100} (i.e. 1 year, 2 year and 100 year floods) for any streams, lakes or ponds in close proximity to the proposed sewers • Detail drawings (at a scale of 1:500 at A1) showing: o **Sewer maintenance holes** ▪ Unique Identifier ▪ Horizontal position (Easting and Northing) ▪ Vertical position (AHD cover level) ▪ Size (DN) ▪ Material of construction ▪ Construction method (pre-cast or cast insitu) ▪ Type and class of cover ▪ Offsets ▪ Additional information for external drops (ED): size (DN), drop height (metres) and material ▪ Additional information for educt vents: horizontal position (Northing and Easting), size (DN), height (metres) and material. Note: When the vent is not located at the maintenance hole, the connecting conduit shall be treated as a sewer main. ▪ Additional information for induct vents: horizontal position (Northing and Easting), size (DN), height (metres) and materials o **Sewer maintenance shafts and sewer rodding points** ▪ Unique identifier ▪ Horizontal position (Easting and Northing) ▪ Vertical position (AHD cover level) ▪ Size (DN) ▪ Material o **Sewer vertical drops** ▪ Unique identifier ▪ Horizontal position (Easting and Northing) ▪ Vertical position (AHD cover level) ▪ Size (DN) ▪ Material

Item	Amendments (for Developer Provided Asset Drawings)
	o **Sewage pumping stations** ▪ Unique identifier ▪ Wet well size (DN) ▪ Wet well depth (metres) o **Sewage storage tanks** ▪ Unique identifier ▪ Horizontal position (Easting and Northing) ▪ Vertical position (AHD cover level) ▪ Size ▪ Depth to invert (metres) o **Sewage overflow structures** ▪ Unique identifier ▪ Horizontal position (Easting and Northing) ▪ Vertical position (AHD cover level) ▪ Size ▪ Material o **Sewer dead ends** ▪ Unique identifier ▪ Horizontal position (Easting and Northing) o **Straight sewer mains** ▪ Horizontal length (at the IP for design; at the inside face of structure for WAE drawings) ▪ Invert level at upstream end (at the IP for design; at the inside face of structure for WAE drawings) ▪ Invert level at downstream end (at the IP for design; at the inside face of structure for WAE drawings) ▪ Size (DN) ▪ Material ▪ Class/PN rating ▪ Type of jointing ▪ Grade (%) ▪ Easement width (left of pipe centreline, viewed downstream) ▪ Easement width (right of pipe centreline, viewed downstream) ▪ Bedding type ▪ Number of scour stops o **Horizontally curved sewers** ▪ As for straight sewer mains with the additions as per below: • Radius of centreline of horizontal curvature (metres) • Horizontal position – start of curve (Easting and Northing) • Horizontal position – end of curve (Easting and Northing) o **Vertically curved sewers** ▪ As for straight sewer mains with the additions as per below: • Rate of change of grade (metres per metre) • Starting grade (%) • Ending grade (%) • Intermediate invert levels at a maximum of 5.0 metre spacings o **Property connections** ▪ Size (DN) ▪ Material ▪ Horizontal position (Easting and Northing) at main slope junction ▪ Horizontal position (Easting and Northing) at end of tie ▪ Invert level at upstream end (AHD) ▪ Invert level at downstream end (at drop into a buried vertical riser or at slope junction) (AHD) ▪ Buried vertical riser (if installed)

Item	Amendments (for Developer Provided Asset Drawings)
	• Longitudinal sections showing: o Chainages o Finished surface and invert levels o Details of adjacent structures likely to be a concern for all mains larger than DN300 or deeper than 5.0 metres; or with less than the required minimum cover; or passing closer than the minimum clearances to other services • Full construction detail drawings for all non-standard or special works (e.g. special structures, drops, non-standard maintenance holes, pump stations etc.) If a sewage pumping station is proposed, additional drawing and design (e.g. Safety-in-Design) requirements apply in accordance with *STD-SPE-G-010* and *STD-SPE-G-019*. Icon Water shall provide these once Design Submission 1 has been received (if not prior).
10	**Requirements for Work As Executed (WAE) Drawings** With specific reference to *STD-SPE-C-004*, a Qualified Surveyor shall be engaged to record all positional (e.g. Northing and Eastings, depths of cover, finished surface levels, invert levels, benching levels, overflow levels etc.) as detailed in Items 8 and 9 above as well as any additional positional details provided in *STD-SPE-C-001* (as applicable). Survey and constructional tolerances shall meet the requirements of *STD-SPE-C-004*. The Qualified Surveyor is required to mark-up the latest design drawings with actual positions, heights, depths etc. and pass these marked-up drawings to the contractor for production of accurate WAE drawings. The Qualified Surveyor is required to provide a copy of such marked-up drawings upon request from Icon Water.
11	**The Use of Icon Water's SD Series (Standard) Drawings** Icon Water *SD Series* (Standard) drawings ending with a "-D" suffix (e.g. *SD-5010-D*) may be referenced by the contractor when providing Design Submission 2 and WAE drawings (without having to redraw any details) on the proviso that: • The full list of *SD Series* drawings that have been referenced in the design drawing set is shown by full drawing number and title on the drawing set's cover sheet or locality plan (whichever is more convenient). • A single detail may be referenced, rather than the complete drawing, if the detail is referenced in the design drawing set by "Detail Reference" or "Part Number" (e.g. "PN823301 on Drawing SD-8233-D"). • The referenced "-D" drawing is not modified in any way whether that be by PDF mark-up additional notes, or any other means. That is, if the drawing requires any modification, no matter how minor, it must be redrawn in its entirety and included as a drawing in its own right complete with a project specific drawing as part of the design drawing set. Icon Water *SD Series* (Standard) drawings ending with a "-C" suffix shall not be referenced in the design drawing set as they are intended to be conceptual in nature and have been devised to show minimum mandatory requirements relating to reliability, durability, safety, operability and maintainability issues.

Rev.	Date	Reason for Revision	By (Principal Engineer)
A	02/07/18	Issued for mandatory use as an amendment to *STD-SPE-G-018* for developer-provided assets for the water supply and sewerage network.	 K. Danenbergsons

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Icon Water Limited

STD-SPE-G-018
Design Standards
Standard Specification Drafting

ABN 86 069 381 960

Document Authorisation

Author:	Drawing Control Officer	Signed:	Date:
Checked by:	Principal Engineer Infrastructure Standards Development	Signed:	Date: 17Sep15
Approved by:	General Manager Asset Management	Signed:	Date:

Document Revision Control

Version	Description of Revision	Person Making Issue	Date	Approval
1	Initial Icon Water draft issued for review	Paul Chalmers	01Jul15	
2	Formatted for publication	Megan Cursley Denis Baker Simon Webber	17Sep15	
3	Updated for Engineering Workflow	Paul Chalmers Karl Danenbergsons	12 July 16	

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Disclaimer

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Table of Contents

Abbreviations

CAD	Computer Aided Design drafting package
DCO	Drawing Control Officer, representative from Icon Water
DMS	Drawing Management System
WAE	Work As Executed (drawing)
WSSS	Water Supply and Sewerage Standards

1 Background

Icon Water is responsible for the management, operation and maintenance of the Water Network and the Sewerage Network.

The Water and Sewerage Network (Design and Maintenance) Code made under the Utilities (Technical Regulation) Act 2014 requires Icon Water Ltd to develop, maintain and implement design standards for the Water Network and the Sewerage Network. This standard specification forms part of the Design Standards for the Water Network and the Sewerage Network.

2 Scope

This standard specification details the requirements for drawings prepared for submission to Icon Water under contractual obligations using an approved Computer Aided Design (CAD) drafting package (specified in section 8.1).

3 Purpose

This standard specification is part of the Water Network and Sewerage Network Design Standards and applies to all the design, construction, commissioning, operations and maintenance of infrastructure within the Water Network and Sewerage Network of Icon Water.

This standard specification applies to Icon Water personnel, contract personnel engaged by Icon Water, developers including their consultants and construction contractors contracted to handover assets to Icon Water, operations contractors engaged by Icon Water and maintenance contractors engaged by Icon Water for approval and issue into the Icon Water Drawing Management System (DMS): BlueCielo Meridian.

4 Business risk identification

Expense of reworking drawings at the later stages of Project development – poor quality drawings are expensive to update in the future. Incorrect drawings can be hazardous to personnel safety.

5 Responsibilities

5.1 Design Authority

The Design Authority shall be responsible for approval of this standard specification and any amendments to it.

5.2 Team Leader Geospatial Asset Services

The Team Leader Geospatial Asset Services shall be responsible for the drawing management system.

5.3 Project Manager

The Project Manager (both internal to Icon Water and external) for new assets and renewal assets provision to Icon Water shall be responsible for ensuring that the design, construction, commissioning and handover of projects complies with this standard specification.

5.4 External Designers, Contractors and Suppliers

Designers, contractors and suppliers external to Icon Water shall be responsible for ensuring that:

They follow the requirements of this standard specification in the design, construction, commissioning and handover of projects.

6 Setup Files

This section provides details to access updated electronic copies of this document, reference drawings and setup files to standardise drawing construction of all facilities, plant and equipment. These files are available on request on disc or can be emailed as a zip file.

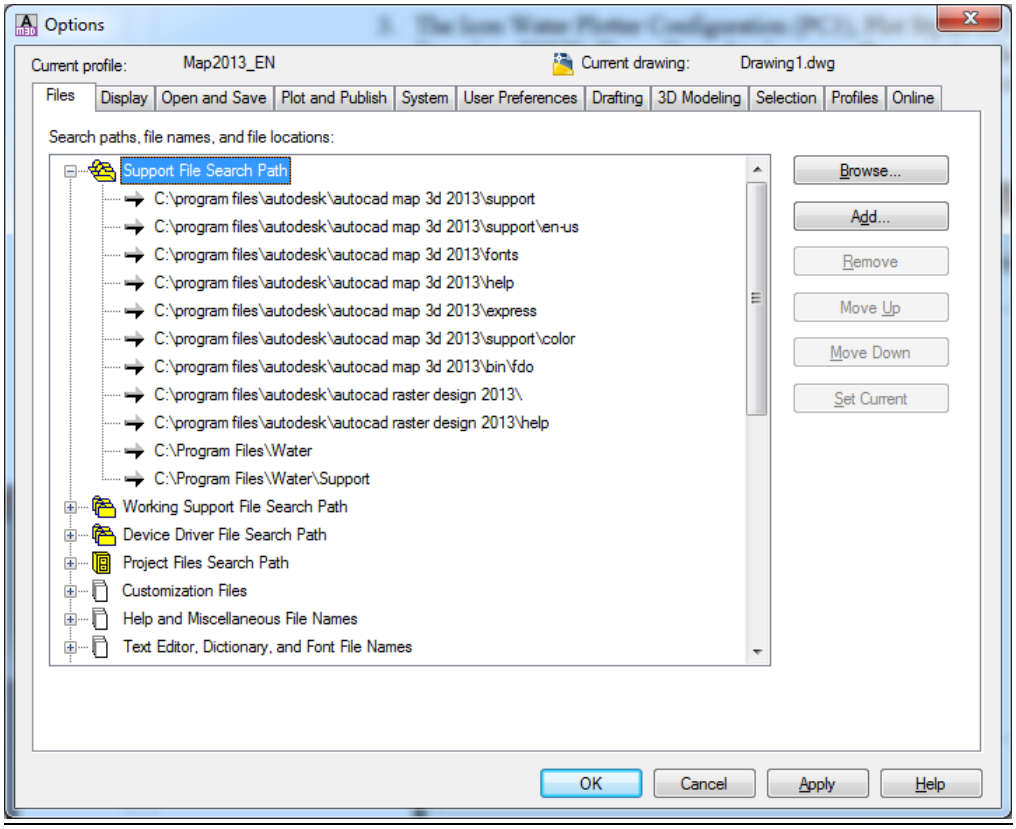
6.1 Setup Instructions

6.1.1 Contractor Setup

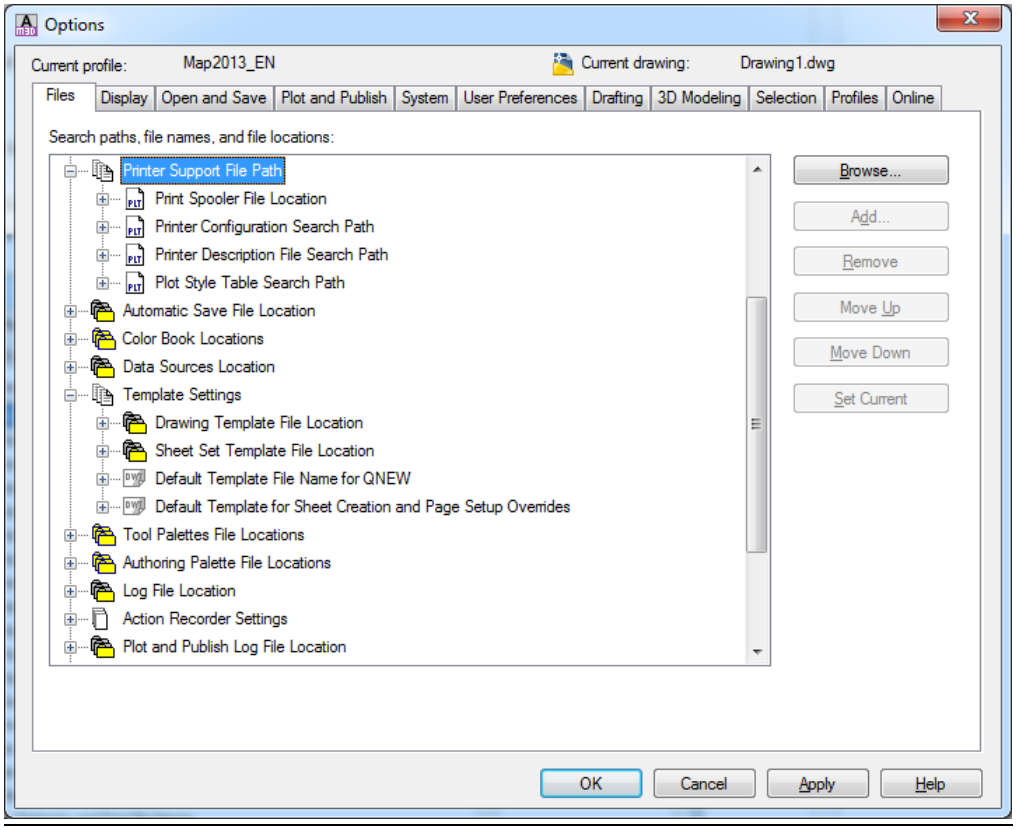
Icon Water has made available drawing templates and support files to facilitate the creation of drawings compliant to this standard. To configure AutoCAD for this please follow instructions in *Icon Water Contractor Setup* document. This will be available on Icon Water's SFTP Portal or by email request as a zip file.

To load the menus into AutoCAD:

- Start AutoCAD and add the following paths to the "Support File Search Path":
- C:\Program Files\Icon Water
- C:\Program Files\Icon Water\support



Setup - Options dialogue box in AutoCAD - Support Files Search Path



Setup - Options dialogue box in AutoCAD – Template Settings

6.1.2 Corporate Setup (for Icon Water staff only)

Ensure the workstation AutoCAD version contains the Standard, Electrical and Hydraulics pull down or partial menus.

If the AutoCAD version does not contain the menus or problems are identified. Please contact the CAD Systems Administrator or helpdesk on extension #3331.

7 Contacts and Inquiries

7.1 Feedback

In order to maintain a workable standard, we appreciate and value any feedback from all users. Should you wish to forward any comments, suggestions or issues regarding the content of this document please feel free to contact us.

Drawing Control Officer

Icon Water

Geospatial Asset Services

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Mitchell ACT 2911

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8 Standard Drawing Construction Guidelines

8.1 General Drafting Requirements

All drawings shall be produced using AutoCAD 2013 and Inventor 2013 in accordance with this standard specification and contract documents.

It should be noted that in some instances, there are variations to the requirements of drawings as detailed in the contract document to the content defined in this standard specification, and the Contractor should be aware of this.

All drawings to be submitted to Icon Water for approval shall be electronic files named as per the drawing number refer to section 8.5 and 8.6 for details. All drawings under contract are to be submitted in AutoCAD 2013 and Inventor 2013 drawing file formats, and equipment manufacturer's drawings, known as vendor drawings, are to be submitted in Adobe Acrobat portable document file format (PDF), subject to the approval of the Project Manager.

With written approval from Icon Water, Drawings and models may be developed in packages other than Autodesk AutoCAD or Inventor. All deliverable files must be converted to a native Autodesk format prior to submission and acceptance.

The construction of the drawing is to be identical in structure and will follow the guidelines as outlined in this section. This will enable drawings to be included into the Icon Water Drawing Management System (DMS) without issues, and be revised and printed without the need for familiarisation with the structure of the drawing.

All drawing objects, including lines, polylines, blocks, symbols, circles and arcs are to be created or inserted using the object snap command to ensure that all vector data connects correctly and the drawing is presented in a professional manner.

8.2 System Variables

The following AutoCAD system variables or command settings are required to be set for CAD drawings:

Table 1: AutoCAD System Variables and Command Settings

Drawing Units		
Measurement	Unit:	1
Length	Type: Precision:	Decimal 0.000
Angle	Type: Precision: Direction:	Decimal Degrees 0.00 Clockwise
Direction	Base Angle:	East 0˚00'00"
Drawing Commands		
Linetype Scale	LTSCALE	1.0

Note: For survey information in drawings, compliance with practice directions issued by the Surveyor-General under the *Surveyors Act 2007* is required.

8.3 Drawing Templates

The standard drawing template files contain layer name, linetype, linestyle, text and dimension style definitions.

- **Water.dwt** – to be used for general engineering drawings
- **Hydraulics.dwt** – Contains all content of *water.dwt* but also contains specialised linetypes for Icon Water's network assets. E.g. Sewer, Water and Effluent Reuse Networks.

Standard drawing borders will be used and inserted as a block for all drawings, refer to section 8.4 for details.

Standard drawing templates are supplied on the Icon Water Standard Drafting Zip File, or supplied separately upon request.

8.4 Drawing Borders

All drawings will contain an Icon Water standard drawing border sheet to be inserted as a block, not as an external reference file.

The following table lists the various sets of drawing borders used in Icon Water. The reasoning for different sheet sets depends on its use and content for disclaimers and areas for Icon Water and contractor logos.

Table 2: Icon Water Standard Drawing Borders (External Contractors)

Category A – EXTERNAL SHEETS			
Sheet Name / File Name	**Size**	**Sheet Size**	**Purpose / Use**
Icon_Ext_A1 Icon_Ext_A2 Icon_Ext_A3 Icon_Ext_A4 Icon_Ext_Survey_A3	A1-L A2-L A3-L A4-P A3-L	891 × 594 mm 594 × 420 mm 420 × 297 mm 210 × 297 mm 420 × 297 mm	For contractor use in all drawings.

Table 3: Icon Water Standard Drawing Borders (Internal)

Category B – PROJECT SHEETS			
Sheet Name / File Name	**Size**	**Sheet Size**	**Purpose / Use**
WATER_A1 WATER_A2 WATER_A3 WATER_A4	A1-L A2-L A3-L A4-L	891 × 594 mm 594 × 420 mm 420 × 297 mm 297 × 210 mm	For corporate use in projects.
Category C – PROJECT SHEETS			
Sheet Name / File Name	**Size**	**Sheet Size**	**Purpose / Use**
WATER_A3_PIPES WATER_A4_PIPES WATER_A4_METERS	A3-L A4-P A4-P	420 × 297 mm 297 × 210 mm 297 × 210 mm	For corporate use in pipe bursting/water meter drawings only.
Category D – STANDARDS SHEETS			
Sheet Name / File Name	**Size**	**Sheet Size**	**Purpose / Use**
A1_DRAWING A2_DRAWING	A1-L A2-L	891 × 594 mm 594 × 420 mm	For corporate use in the Icon SDW / SDS standard drawings only (Amended from WSSS).

The standard drawing borders are available under the defined categories in the “Hydraulics” menu of AutoCAD. (Internal Use)

8.4.1 Drawing Border Attributes

The standard drawing border contains variable fields as defined below using AutoCAD attributes “ATTEDIT” command for input of drawing information.

8.4.2 Modifications to Drawing Borders

Under no circumstances will the standard drawing border be exploded, modified or renamed by the contractor or draftsperson.

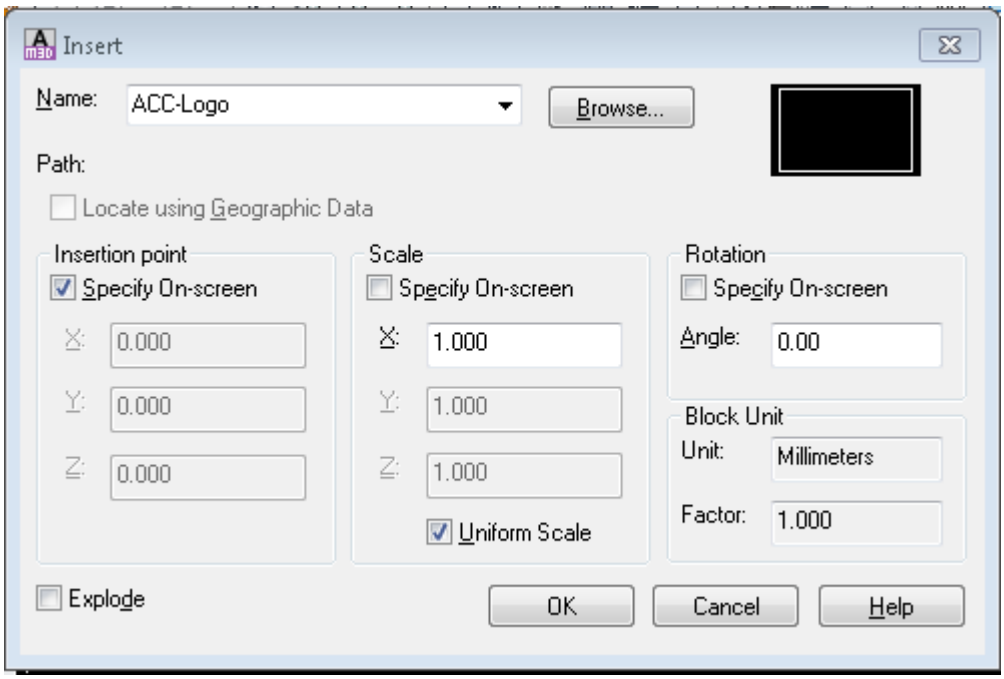
Contractor logos should be added in the space provided to the left of the Icon Water logo as separate blocks.

- The contractor logo will consist of lines and hatching (as shown in red) and not special text fonts, attached images or x-refs (external reference files) to achieve the desired result.
- The contractor details below the logo should be of standard AutoCAD text font to minimise issues associated with substitute fonts and the need for block updates.

Acc

A Contractor Company Pty. Ltd.

100 Smith Street
Anytown Vic 3905
Phone: (03) 9911 0000 E-mail: acc@acontractorcompany.com.au



Example of Adding Contractor Logo as a Block

8.5 Drawing Numbers

All drawings will contain an Icon Water drawing number as shown in the drawing border. The Icon Water drawing number is obtained from the Icon Water Drawing Control Officer or assigned representative as determined by the Icon Water Drawing Management System (DMS).

The drawing number will follow the Icon Water Procedure: “Drawing Management – Drawing Numbering Structures / Title Construction”.

The drawing number consists of two parts, a series and register number. The series determines the structure or drawing type, and the register number is the sequential number (PPP, PPPP or PPPPP) as indicated in the Icon Water DMS.

The drawing number shall be similar to the following formats and shall be used in all communications with Icon Water:

Table 4: Icon Water Drawing Number Formats

Series	Description	Format
CF	Water Network Drawings	CFYY/PPPP
CX#####	Temporary Drawing number used in Projects	CX#####
EW	External Works (Consultants) Network Drawings	EWPPPP
LM	Lower Molonglo Water Quality Control Centre (LMWQCC) Fyshwick Effluent Reuse Plant (FERP) Fyshwick Sewage Treatment Plant (FSTP) Southwell Park Wastewater Treatment Plant Sewage Pump Stations	LMXYZ-PPPP
PW	Preliminary Design Drawings (Temporary Project Drawing Numbers)	PWYY/PPPPP
UR	Uriarra Wastewater Treatment Plant	URXYZ-PPPP
WC	Cotter & Murrumbidgee Raw Water Transfer System	WCXYZ-PPPP
WG	Googong Water Treatment Plant	WGXYZ-PPPP
WM	Murrumbidgee Bulk Water	WMXYZ-PPPP
WQ	Bulk Water Quality and Supply	WQXYZ-PPPP
WS	Stromlo Water Treatment Plant (SWTP)	WSXYZ-PPPP
SDW	Standard Drawing Water	SDW-YPPP
SDS	Standard Drawing Sewerage	SDS-YPPP
SDR	Standard Drawing Reuse	SDR-YPPP
SDG	Standard Drawing General	SDG-YPPP

8.5.1 Drawing Numbers for Contractors

For contractors (external to and not engaged by Icon Water) - the Project Manager appointed by the contractor shall submit a Drawing Register in spreadsheet format (see Table 5) containing new drawings required and existing drawings to be modified. on receipt of drawing register Icon Water will provide drawing numbers for the new drawings and update the register.

The Project Manager should also nominate in the Drawing Register existing Icon Water drawing numbers requiring modification or under amendment. For details regarding the modification of existing Icon Water drawings refer to section 8.22

Table 5: Example of a Drawing Register

Name	Drawing No	Rev	Status	Old Drawing Number	Sheet	Title1	Title2	Title3	Title4	Title5	Asset	Asset Type	Asset SubType	Due Date	Project No	Drawn	Designed	Verification PM	Design Auth	Size
CF05_0613.dwg	CF05/0613	A	Issued For Review		1	TITLE 1	TITLE 2	TITLE 3	TITLE 4	TITLE 5	Networks	CF	CF00	6/07/2015	CX10004	A. Person	A. Brick		M. Bursle	A1
CF19_0005.dwg	CF19/0005	C	Issued For Tender	CX10004-DWG-030	2	TITLE 1	TITLE 2	TITLE 3	TITLE 4	TITLE 5	Networks	CF	CF10	7/07/2015	CX10004	T. Day	C. Beck	E. Tharmaratnam	A. Hayes	AI
CF19_0006.dwg	CF19/0006	C	Issued For Construction	CX10004 DWG 019	3	TITLE 1	TITLE 2	TITLE 3	TITLE 4	TITLE 5	Networks	CF	CF10	8/07/2015	CX10004	A. Shaw	A. Brick		M. Bursle	A2

8.5.2 Drawing Numbers for Icon Water staff

The drafting officer will obtain Icon Water drawing numbers using the *automatic drawing numbering tool* in the Icon Water DMS (*Meridian*).

For CX##### drawing numbers

These drawing numbers will be used temporarily until the drawing number is replaced with the appropriate Icon Water drawing number as defined in section 8.5 and Table 4.

8.6 File Names

All drawing files submitted to Icon Water shall use the file naming conventions specified and no variation will be accepted, according to the Drawing Numbering Structure/Title Construction procedure.

8.6.1 Drawing File Names

The drawing file name is derived from the Icon Water drawing number provided, refer to section 8.5. The format of the file name involves replacing the dashes "-" and forward slashes "/" with underscores "_" as shown below.

The following table defines the file naming conventions for drawing files (DWG or PDF format) submitted to Icon Water and examples of its use:

Table 6: Drawing File Name Conventions

Icon Water Drawing Number	File Name	Example
CFYY/PPPP	CFYY_PPPP.dwg	CF08_0001.dwg
EWPPPP	EWPPPP.dwg	EW4750.dwg
LMXYZ-PPPP	LMXYZ_PPPP.dwg	LM1E0_0144.dwg
URXYZ-PPPP	URXYZ_PPPP.dwg	UR1E2_0001.dwg
WCXYZ-PPPP	WCXYZ_PPPP.dwg	WC3C1_0001.dwg
WGXYZ-PPPP	WGXYZ_PPPP.dwg	WG7S1_0001.dwg
WMXYZ-PPPP	WMXYZ_PPPP.dwg	WM2M2_0001.dwg
WQXYZ-PPPP	WQXYZ_PPPP.dwg	WQ1S2_0025.dwg
WSXYZ-PPPP	WSXYZ_PPPP.pdf	WS2G4_0006.pdf
SDW-YPPP	SDW_YPPP.dwg	SDW_A050.dwg
SDS-YPPP	SDS_YPPP.dwg	SDS_E001.dwg
SDR-YPPP	SDR_YPPP.dwg	SDR_M001.dwg
SDG-YPPP	SDG_YPPP.dwg	SDG_G001.dwg

8.6.2 Hybrid Drawing Attachments

All image attachments and external references will be provided using the hybrid drawing file naming convention at Table 6 and include an attachment or external reference number as defined below:

Xrefs can be used during project development phase; xrefs must be bound, trimmed and purged prior to being released as WAE.

Where an XREF is an image with geo-referencing (e.g. an Aerial Photo) a hybrid drawing may be submitted with the following naming convention.

Table 7: Hybrid Drawing File Name Conventions

Hybrid Drawing Filename	Image Attachment	External Reference
CF08_0001.dwg	CF08_0001_I01.jpg CF08_0001_I02.bmp	CF08_0001_X01.dwg

Images such as photographs or graphics shall be copied and pasted into the drawing rather than using an image attachment.

8.7 Drawing Title

The drawing title as shown in the standard drawing border will accurately describe the content of drawing. It consists of multiple lines of uppercase text to fit using AutoCAD attributes within the fields or tags using the “ATTEDIT” commands when inserting the drawing border (see section 8.4 for details).

Following submission of drawings, the input attributes are synchronised or used to describe the content and locate records in the Icon Water DMS.

Title text outside of the provided Title Block or exploding of the block to enter text will not be accepted under any circumstances.

The drawing title shall follow as per one of these categories as shown below:

Table 8: Drawing Title Structures

Category A – CONTRACTOR SHEETS TITLE		
LINE No.	**DESCRIPTION**	**EXAMPLE**
Line 1:	Plant Structure Name - Location / Structure Area	GOOGONG WTP - FLUORIDE & PAC STRUCTURE
Line 2:	Structure Sub Area	FLUORIDE & PAC ELECTRICAL ROOM
Line 3:	Equipment No. (if required) and/or Drawing Description	WG-7301TC FIELD DISTRIBUTED I/O CUBICLE
Line 4:	Further Description	GROUP 3 MODULE 7 – ANALOGUE OUTPUT MODULE
Line 5:	Drawing Type	CONNECTION DIAGRAM

Category B – HYDRAULIC SHEETS TITLE (CF & EW series)		
LINE No.	**DESCRIPTION**	**EXAMPLE**
Line 1:	Location / Suburb Name	BRADDON
Line 2:	Block & Section and/or Road Name	SECTION 25 BLOCK 15 – IPIMA & IJONG STREETS
Line 3:	Project Name / Details	UNIT DEVELOPMENT
Line 4:	Project / Drawing Description	HYDRAULIC SERVICES
Line 5:	Drawing Type	EXTERNAL SERVICES PLAN

Table 8: Drawing Title Structures (continued)

Category C1 – PROJECT SHEETS TITLE (CF, LM, WQ & WS series)		
LINE No.	**DESCRIPTION**	**EXAMPLE**
Line 1:	Discipline / Division / Branch Name	CANBERRA SEWERAGE
Line 2:	Project Name	MAIN OUTFALL SEWER AT YARRALUMLA CREEK
Line 3:	Drawing Description	CROSSING REPAIRS TO SEWERAGE STRUCURE
Line 4:	Further Description	REPAIRS TO SCOURED EMBANKMENT
Line 5:	Drawing Type	DETAIL PLAN – SHEET 1 OF 2

Category C2 – PROJECT SHEETS TITLE (LM series – External Facilities)		
Line No.	**Description**	**Example**
Line 1:	Plant Structure Area	FYSHWICK SEWAGE TREATMENT PLANT
Line 2:	Plant Structure Sub Area	PLANT AREA
Line 3:	Equipment No. (if required) and/or Drawing Description	FY-9982PU SECONDARY FERROUS CHLORIDE DOSING SYSTEM
Line 4:	Further Description	SUPPLY PUMP
Line 5:	Drawing Type	GENERAL ARRANGEMENT

Category C3 – PROJECT SHEETS TITLE (Pipes series)		
Line No.	**Description**	**Example**
Line 1:	Location / Suburb Name	BRADDON
Line 2:	Job Description	REPLACE 150mm VC SEWER MAIN
Line 3:	Block / Section	BLOCK 1 SECTION 1 TO BLOCK 2 SECTION 2
Line 4:	Further Block / Section (if required)	BLOCK 3 SECTION 3 TO BLOCK 4 SECTION 4
Line 5:	Further Block / Section (if required)	BLOCK 5 SECTION 5 TO BLOCK 6 SECTION 6

Category D – STANDARDS SHEETS TITLE (SDW & SDS series)		
Line No.	**Description**	**Example**
Line 1:	Drawing Series	STANDARD DRAWING
Line 2:	Water/Sewer/Reuse/General	WATER
Line 3:	Drawing Discipline	STRUCTURAL
Line 4:	Drawing Description	STEP-TYPE LADDER FOR VALVE PITS
Line 5:	Further Description	GENERAL ARRANGEMENT

Where possible the Project Officers or DCO are to assist contractor and/or drafting officers of drawing title details.

8.8 Approval Signatures

The approval signatures section as shown in the standard drawing border defines the representatives responsible for the content of the drawing. It consists of names as a first initial and full surname to be inserted into the fields or tags of position titles using attributes in the drawing border. Use the "ATTEDIT" command in AutoCAD (see section 8.4.1 for details).

Table 9: Approval Signatures

Category A – CONTRACTOR SHEETS APPROVAL SIGNATURES			
Attribute Tag	**Attribute Prompt**	**Definition**	**Example**
EXTDRAWN	Drawn By	Name of drafting officer / CAD operator responsible for the construction of the drawing.	C. Drafter
EXTDSGN	Designed:	Name of person responsible for the design of the drawing.	C. Designer
EXTCHCKD	Design Checked:	Name of person responsible for checking the drawing and handover of works.	C. Checker
EXTPM	Contractor Project Manager:	Name of project manager responsible for the works as handed over by contractors and the coordination of the project.	C. Projman
CONCURRED	Icon Water Concurred	Name of Icon Water engineer responsible for checking the drawing and handover of works	I. Concur

Category B – PROJECT SHEETS APPROVAL SIGNATURES (Internal)			
Attribute Tag	**Attribute Prompt**	**Definition**	**Example**
DRAWN	Drawn	Name of drafting officer / CAD operator responsible for the construction of the drawing.	I. Drafter
DESIGNED	Designed	Name of person responsible for the design of the drawing.	I. Designer
CHECKED	Engineering Checked:	Name of engineer responsible for checking the drawing and the installation / construction of works.	I. Checker
VERIFY	Verified:	Name of engineer responsible for the verification of the design.	I. Verifier
DESAUTH	Design Authority:	Name of Icon Water design authority responsible for the design.	I. Authoriser

Category C – STANDARD SHEETS APPROVAL SIGNATURES			
Attribute Tag	**Attribute Prompt**	**Definition**	**Example**
DRAWN	Drawn	Name of drafting officer / CAD operator responsible for the construction of the drawing.	I. Drafter
DESIGNED	Designed	Name of person responsible for the design of the drawing.	I. Designer
CHECKED	Engineering Checked:	Name of engineer responsible for checking the drawing and the installation / construction of works.	I. Checker
VERIFY	Verified:	Name of engineer responsible for the verification of the design.	I. Verifier
DESAUTH	Design Authority:	Name of Icon Water design authority responsible for the design.	I. Authoriser

8.9 Drawing Revisions

The drawing revisions describe the status of a drawing to ensure the latest version is currently used. It will provide amendment details regarding the design, development, and construction or installation stages of projects.

To allow automated integration with Icon Water's Drawing Management System (DMS) only one revision line can be populated per design phase. When a drafting change is initiated the bottom line of the revision table will be made blank, ready for the upcoming revision/issue.

If a contractor requires additional revisions for their own internal design review process they may add an additional table into the drawing to record their revisions.
The title block shall not be modified to achieve this.
(Table shall be removed prior to Work As Executed).

The revision letter and a brief description similar to below, along with the date of amendment and initials are to be included using AutoCAD attributes within the standard drawing border. Revision descriptions shall include the current project number.

Previous authorised revisions shall not be deleted from the revisions table on the drawing.

The following applies to drawing development revisions for new and modified drawings:

Table 10: New and Modified Drawing Development Revisions

Status	Revision Character	Revision Description (Example)
Drawing Development	A	CONCEPT DESIGN – CX10001
	B	ISSUED FOR REVIEW – CX10001
	C	ISSUED FOR TENDER – CX10001
	D	ISSUED FOR CONSTRUCTION – CX10001
	E	WORK AS EXECUTED – CX10001
	F	ISSUED FOR TENDER – CX10002
	G	ISSUED FOR CONSTRUCTION – CX10002
	H	WORK AS EXECUTED – CX10002

The following applies to drawing development revisions for retiring or superseding drawings:

Table 11: Superseding Drawing Development Revisions

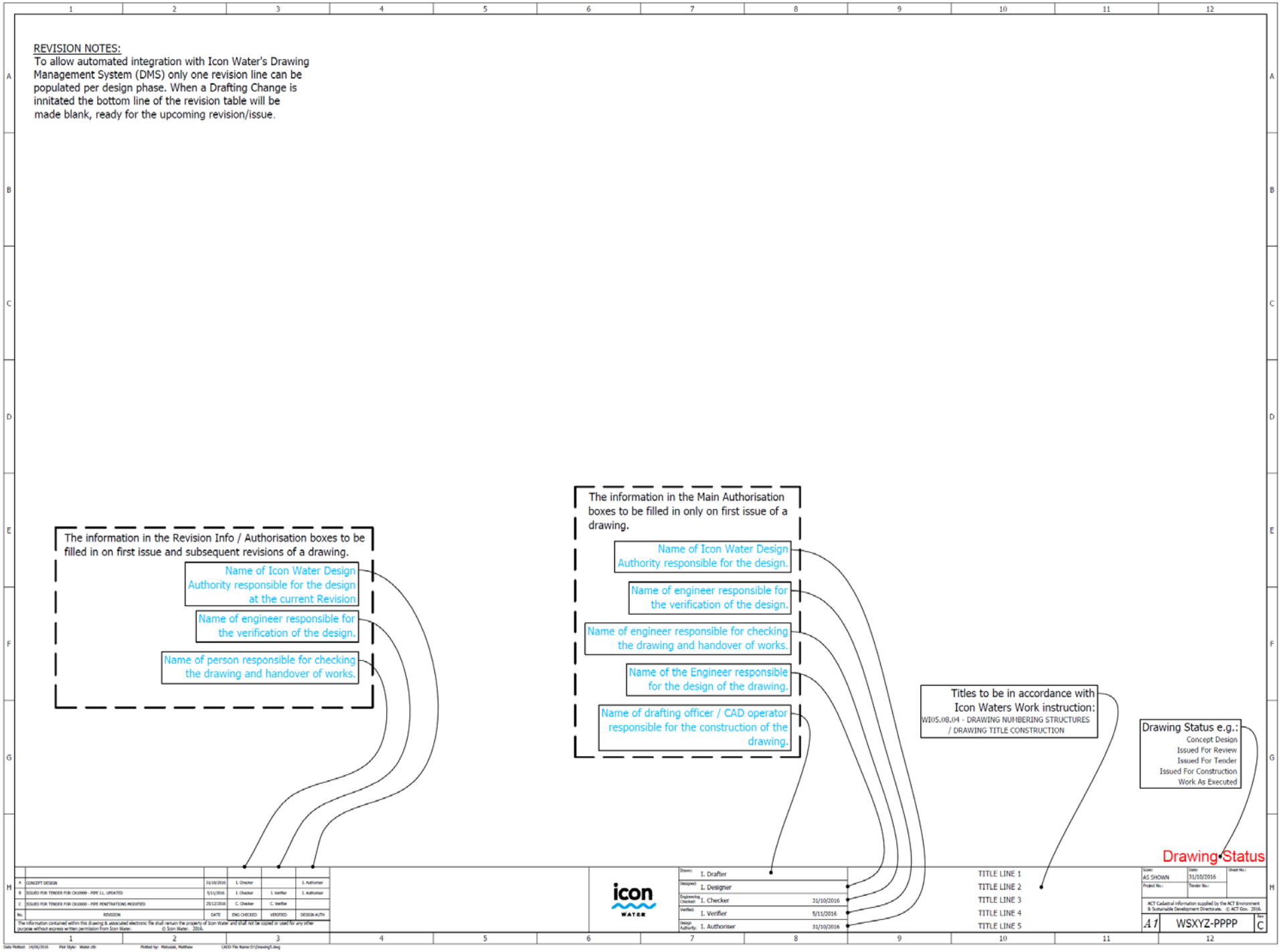
Status	Revision Character	Revision Description
Superseded	X	SUPERSEDED DRAWING REFER TO <*Icon Water Drawing Number*>

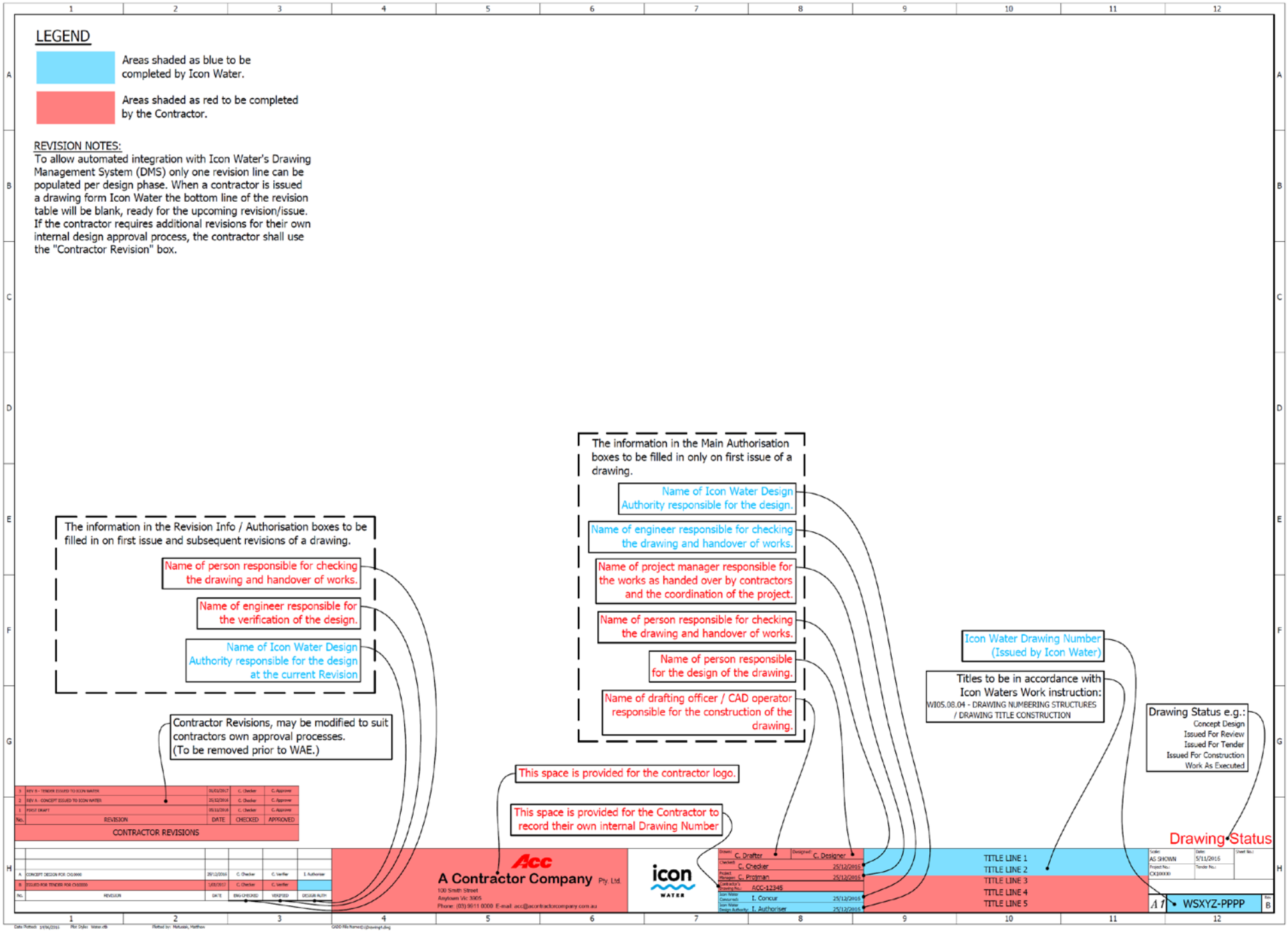
8.10 Drawing Information Section

The drawing border contains standard drawing information as defined in AS 1100 regarding the following content:

Table 12: Drawing Information

Status	Description	Example
Scale	Scale of drawing content based on actual size	Refer to Table 18.
Date	Initial production date of drawing using date format, *dd/mm/yyyy*	20/03/2014
Sheet Number	Number of drawing within set or series, e.g. Sheet 2	2
Project Number	Icon Water project number	CX###### / MM######
File Number	Icon Water file reference number	GYY/XXXX
Tender Number	Icon Water tender contract number	XXXX-PPP
Sheet Size	ISO Standard 'A' or 'B' series drawing sheet size	A0, A1, A2, A3, A4 or B1
Drawing Number	Icon Water drawing number	CF14/0001
Revision	Drawing revision letter as per the revision notes	A


REVISION NOTES:
To allow automated integration with Icon Water's Drawing Management System (DMS) only one revision line can be populated per design phase. When a Drafting Change is innitated the bottom line of the revision table will be made blank, ready for the upcoming revision/issue.
The information in the Revision Info / Authorisation boxes to be filled in on first issue and subsequent revisions of a drawing.
Name of Icon Water Design Authority responsible for the design at the current Revision
Name of engineer responsible for the verification of the design.
Name of person responsible for checking the drawing and handover of works.
The information in the Main Authorisation boxes to be filled in only on first issue of a drawing.
Name of Icon Water Design Authority responsible for the design.
Name of engineer responsible for the verification of the design.
Name of engineer responsible for checking the drawing and handover of works.
Name of the Engineer responsible for the design of the drawing.
Name of drafting officer / CAD operator responsible for the construction of the drawing.
Titles to be in accordance with Icon Waters Work instruction:
WI05.08.04 - DRAWING NUMBERING STRUCTURES / DRAWING TITLE CONSTRUCTION
Drawing Status e.g.:
Concept Design
Issued For Review
Issued For Tender
Issued For Construction
Work As Executed
Drawing Status
A CONCEPT DESIGN 31/10/2016 I. Checker I. Authoriser
B ISSUED FOR TENDER FOR CK10999 - PIPE I.L. UPDATED 5/11/2016 I. Checker I. Verifier I. Authoriser
C ISSUED FOR TENDER FOR CK10000 - PIPE PENETRATIONS MODIFIED 25/12/2016 C. Checker C. Verifier
No. REVISION DATE ENG CHECKED VERIFIED DESIGN AUTH
The information contained within this drawing & associated electronic file shall remain the property of Icon Water and shall not be copied or used for any other purpose without express written permission from Icon Water. © Icon Water. 2016.
icon WATER
Drawn: I. Drafter
Designed: I. Designer
Engineering Checked: I. Checker 31/10/2016
Verified: I. Verifier 5/11/2016
Design Authority: I. Authoriser 31/10/2016
TITLE LINE 1
TITLE LINE 2
TITLE LINE 3
TITLE LINE 4
TITLE LINE 5
Scale: AS SHOWN
Date: 31/10/2016
Sheet No.:
Project No.:
Tender No.:
ACT Cadastral information supplied by the ACT Environment & Sustainable Development Directorate. © ACT Gov. 2016.
A1
WSXYZ-PPPP
No. C
Date Plotted: 14/04/2016 Plot Style: Water.ctb Plotted by: Matusiak, Matthew CADD File Name: D:\Drawing5.dwg


LEGEND
Areas shaded as blue to be completed by Icon Water.
Areas shaded as red to be completed by the Contractor.
REVISION NOTES:
To allow automated integration with Icon Water's Drawing Management System (DMS) only one revision line can be populated per design phase. When a contractor is issued a drawing form Icon Water the bottom line of the revision table will be blank, ready for the upcoming revision/issue. If the contractor requires additional revisions for their own internal design approval process, the contractor shall use the "Contractor Revision" box.
The information in the Revision Info / Authorisation boxes to be filled in on first issue and subsequent revisions of a drawing.
Name of person responsible for checking the drawing and handover of works.
Name of engineer responsible for the verification of the design.
Name of Icon Water Design Authority responsible for the design at the current Revision
Contractor Revisions, may be modified to suit contractors own approval processes. (To be removed prior to WAE.)
CONTRACTOR REVISIONS
The information in the Main Authorisation boxes to be filled in only on first issue of a drawing.
Name of Icon Water Design Authority responsible for the design.
Name of engineer responsible for checking the drawing and handover of works.
Name of project manager responsible for the works as handed over by contractors and the coordination of the project.
Name of person responsible for checking the drawing and handover of works.
Name of person responsible for the design of the drawing.
Name of drafting officer / CAD operator responsible for the construction of the drawing.
This space is provided for the contractor logo.
This space is provided for the Contractor to record their own internal Drawing Number
A Contractor Company Pty Ltd
icon WATER
Icon Water Drawing Number (Issued by Icon Water)
Titles to be in accordance with Icon Waters Work instruction:
WI05.08.04 - DRAWING NUMBERING STRUCTURES / DRAWING TITLE CONSTRUCTION
Drawing Status e.g.:
Concept Design
Issued For Review
Issued For Tender
Issued For Construction
Work As Executed
Drawing Status
TITLE LINE 1
TITLE LINE 2
TITLE LINE 3
TITLE LINE 4
TITLE LINE 5
A1
WSXYZ-PPPP

8.11 Lines

All drawing objects will be constructed using lines, polylines, circles and arcs.

8.11.1 Linestyles

Standard linestyles as defined in the Australian and ISO standards are to be used in all drawings.

Linestyles to be used are defined in the Icon Water standard drawing templates; Water.dwt and hydraulics.dwt. These include the Icon Water standard linestyle file, Water.lin and the standard AutoCAD linestyle files, ACAD.lin and ACADISO.lin.

Under no circumstances will other linestyles be accepted.

8.11.2 Linetypes and Lineweights

Each drawing object will have a linetype and lineweight using layers defined at section 8.11 The layer manager will be used to define the linetype and lineweight of each drawing object. The properties of the drawing object for linetype and lineweight should be set to BYLAYER and no individual drawing object properties will be changed.

Lineweights will be based on the Icon Water colour-dependent plot styles such as

Water.ctb as defined in Table 13 and Table 14. The line thickness will not be thinner than 0.18mm and drawing objects of major emphasis will be at least 0.35 mm to 0.70 mm. To differentiate between new and existing drawing objects, the existing details should be shown using greytones.

For linetype scales, the LTSCALE AutoCAD command should be set to 1.0, however the linetype scale in the drawing object properties will vary accordingly to the scale of the drawing. For standard scale ratios refer to section 8.19 for details.

Lineweights of polylines should be set to layer colour, however in some cases thick lines may be required and the global width in the drawing object properties will vary accordingly.

Table 13: Bi-Tonal Lineweights and Pen Assignments

Description	Colour	Number	Lineweight	Pen Colour	Pen Number
0.18mm Linestyles	Grey - 25%	9	0.18mm	Black	7
0.25mm Linestyles	Red	1	0.25mm	Black	7
0.35mm Linestyles	Yellow	2	0.35mm	Black	7
0.50mm Linestyles	Green	3	0.50mm	Black	7
0.70mm Linestyles	Cyan	4	0.70mm	Black	7
1.00mm Linestyles	Blue	5	1.00mm	Black	7
1.40mm Linestyles	Magenta	6	1.40mm	Black	7
2.00mm Linestyles	Grey - 75%	8	2.00mm	Black	7

Table 14: Grey Tonal Lineweights and Pen Assignments

Description	Colour	Number	Lineweight	Pen Colour	Pen Number
0.25mm Greytone Linestyles	Grey - 80%	250	0.25mm	51,51,51	250
	Grey - 65%	251	0.25mm	91,91,91	251
	Grey - 50%	252	0.25mm	132,132,132	252
	Grey - 32.5%	253	0.25mm	173,173,173	253
	Grey - 13.75%	254	0.25mm	214,214,214	254
	Grey - 5%	255	0.25mm	255,255,255	255

8.12 Layers

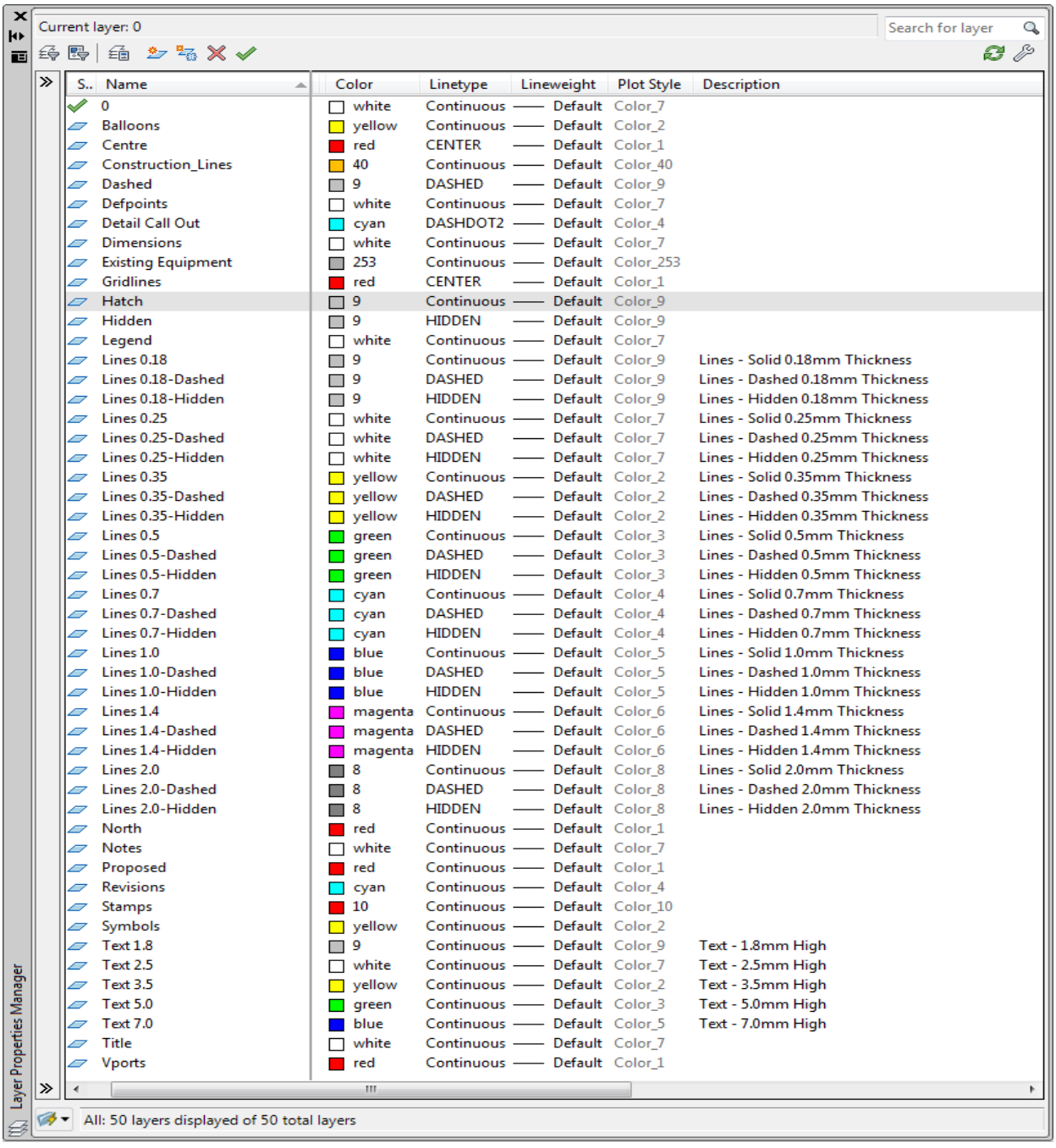
The standard layer name convention shown in Table 15 will be used for the preparation of all drawings in Icon Water. The standard layer names are defined in the standard drawing templates; *Water.dwt* and *Hydraulics.dwt*.

Additional layers are accepted providing the use of appropriate and descriptive layer names. Limit the number of layers to minimise the size of the drawing file and to illustrate quality management of drawings.

All entities shall be set to BYLAYER. Therefore the linetype and colour properties shall be set to BYLAYER.

Under no circumstances should individual drawing object properties be changed.

Table 15: Standard Layer Name Conventions and Description



S..	Name	Color	Linetype	Lineweight	Plot Style	Description
✓	0	white	Continuous	Default	Color_7	
	Balloons	yellow	Continuous	Default	Color_2	
	Centre	red	CENTER	Default	Color_1	
	Construction_Lines	40	Continuous	Default	Color_40	
	Dashed	9	DASHED	Default	Color_9	
	Defpoints	white	Continuous	Default	Color_7	
	Detail Call Out	cyan	DASHDOT2	Default	Color_4	
	Dimensions	white	Continuous	Default	Color_7	
	Existing Equipment	253	Continuous	Default	Color_253	
	Gridlines	red	CENTER	Default	Color_1	
	Hatch	9	Continuous	Default	Color_9	
	Hidden	9	HIDDEN	Default	Color_9	
	Legend	white	Continuous	Default	Color_7	
	Lines 0.18	9	Continuous	Default	Color_9	Lines - Solid 0.18mm Thickness
	Lines 0.18-Dashed	9	DASHED	Default	Color_9	Lines - Dashed 0.18mm Thickness
	Lines 0.18-Hidden	9	HIDDEN	Default	Color_9	Lines - Hidden 0.18mm Thickness
	Lines 0.25	white	Continuous	Default	Color_7	Lines - Solid 0.25mm Thickness
	Lines 0.25-Dashed	white	DASHED	Default	Color_7	Lines - Dashed 0.25mm Thickness
	Lines 0.25-Hidden	white	HIDDEN	Default	Color_7	Lines - Hidden 0.25mm Thickness
	Lines 0.35	yellow	Continuous	Default	Color_2	Lines - Solid 0.35mm Thickness
	Lines 0.35-Dashed	yellow	DASHED	Default	Color_2	Lines - Dashed 0.35mm Thickness
	Lines 0.35-Hidden	yellow	HIDDEN	Default	Color_2	Lines - Hidden 0.35mm Thickness
	Lines 0.5	green	Continuous	Default	Color_3	Lines - Solid 0.5mm Thickness
	Lines 0.5-Dashed	green	DASHED	Default	Color_3	Lines - Dashed 0.5mm Thickness
	Lines 0.5-Hidden	green	HIDDEN	Default	Color_3	Lines - Hidden 0.5mm Thickness
	Lines 0.7	cyan	Continuous	Default	Color_4	Lines - Solid 0.7mm Thickness
	Lines 0.7-Dashed	cyan	DASHED	Default	Color_4	Lines - Dashed 0.7mm Thickness
	Lines 0.7-Hidden	cyan	HIDDEN	Default	Color_4	Lines - Hidden 0.7mm Thickness
	Lines 1.0	blue	Continuous	Default	Color_5	Lines - Solid 1.0mm Thickness
	Lines 1.0-Dashed	blue	DASHED	Default	Color_5	Lines - Dashed 1.0mm Thickness
	Lines 1.0-Hidden	blue	HIDDEN	Default	Color_5	Lines - Hidden 1.0mm Thickness
	Lines 1.4	magenta	Continuous	Default	Color_6	Lines - Solid 1.4mm Thickness
	Lines 1.4-Dashed	magenta	DASHED	Default	Color_6	Lines - Dashed 1.4mm Thickness
	Lines 1.4-Hidden	magenta	HIDDEN	Default	Color_6	Lines - Hidden 1.4mm Thickness
	Lines 2.0	8	Continuous	Default	Color_8	Lines - Solid 2.0mm Thickness
	Lines 2.0-Dashed	8	DASHED	Default	Color_8	Lines - Dashed 2.0mm Thickness
	Lines 2.0-Hidden	8	HIDDEN	Default	Color_8	Lines - Hidden 2.0mm Thickness
	North	red	Continuous	Default	Color_1	
	Notes	white	Continuous	Default	Color_7	
	Proposed	red	Continuous	Default	Color_1	
	Revisions	cyan	Continuous	Default	Color_4	
	Stamps	10	Continuous	Default	Color_10	
	Symbols	yellow	Continuous	Default	Color_2	
	Text 1.8	9	Continuous	Default	Color_9	Text - 1.8mm High
	Text 2.5	white	Continuous	Default	Color_7	Text - 2.5mm High
	Text 3.5	yellow	Continuous	Default	Color_2	Text - 3.5mm High
	Text 5.0	green	Continuous	Default	Color_3	Text - 5.0mm High
	Text 7.0	blue	Continuous	Default	Color_5	Text - 7.0mm High
	Title	white	Continuous	Default	Color_7	
	Vports	red	Continuous	Default	Color_1	

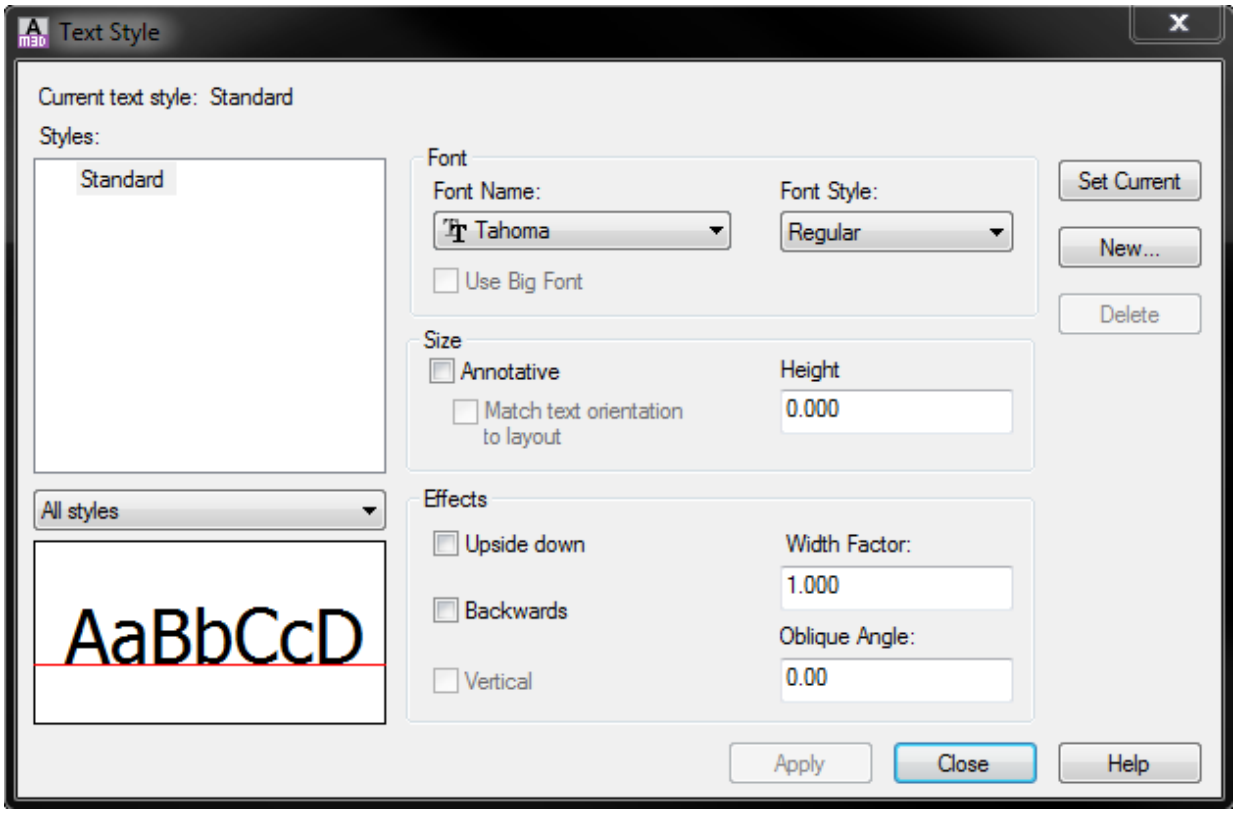
8.13 Text

8.13.1 Text Layers

All text should be created as multiline text (even if only single line). Text will be included on the appropriate Text layer in model and paper space environments. Use text masking and text shortcut symbols (refer to section 8.15) where required. Attribute text will be included on *Equipment Table*, *Instrument Loop Table* and *Title* layers.

8.13.2 Text Styles

All text including dimension and multileader text shall be created using the *Standard* text style. The properties of *Standard* shall be standard AutoCAD fonts available to all users with preference given to TAHOMA font. All text shall be upper case except for unit designations and abbreviations (e.g. Millimetres = mm, Number = No. etc.).



Example of *Standard* Text Style properties

8.13.3 Text Sizes

The character sizes of text is based on AS 1100.101 Table 4.1, however in some cases text heights of 1.8mm and 2mm is used only in electrical A2, A3 and A4 drawings.

All other drawings will use standard text heights of 2.5 mm, 3.5 mm, 5 mm, 7 mm, 10 mm, 14 mm and 20 mm.

No text will be less than 1.8 mm high and more than 20 mm high.

Line spacing and text widths will be set to 1.0.

Table 16: Text Heights, Lineweights and Pen Assignments

Description	Colour	Number	Text Lineweight	Pen Colour	Pen Number
1.8 mm High Text	Grey - 25%	9	0.25 mm	Black	7
2 mm High Text	Red	1	0.25 mm	Black	7
2.5 mm High Text	White	7	0.25 mm	Black	7
3.5 mm High Text	Yellow	2	0.35 mm	Black	7
5 mm High Text	Green	3	0.50 mm	Black	7
7 mm High Text	Blue	5	0.70 mm	Black	7
10 mm High Text	Magenta	6	1.00 mm	Black	7
14 mm High Text	Grey - 75%	8	1.40 mm	Black	7

8.13.4 Text Positioning and Justification

The positioning of the text should be in relation to the object element.

For instance, if the text is positioned on the right side of the object, the text should be left justified.

If the text is positioned in the centre of the object, the text should be centre justified.

If the text is positioned on the left side of the object, the text should be right justified.

8.14 Symbols

Use text associations, including shortcut symbols, abbreviations and settings as shown below:

Table 17: Text Shortcut Symbols, Abbreviations and Settings

Status	Description	Shortcut
∅	Circle Diameter Dimension Symbol	%%c
°	Degree Symbol	%%d
±	Plus / Minus Tolerance Symbol	%%p
n^2	Squared Symbol	Alt+0178
n^3	Cubed Symbol	Alt+0179
<Text>	Text Underline	%%u<Text>

8.15 Blocks

Use standard blocks, or create blocks using the BLOCK and WBLOCK AutoCAD commands based on the symbols in the AS 1100 series as required.

8.16 Hatching

All hatching will be created on an appropriate layer. Lined hatching will be scaled proportionally to the drawing using the hatching tool or drawing object properties, so as to be clearly identifiable when plotted.

Hatching will not be exploded.

Hatching will only be used where necessary. For instance, solid colour hatching should not be overused due to plotting issues with overlapping layers.

8.17 Referencing Drawings

8.17.1 Cross-References

Drawings may contain cross-references to other drawings.

All drawings will be cross-referenced using standard symbols or markers (refer to Icon Water standard drawing SDW-G003) with reference to the Icon Water drawing number based on the formats defined at section 8.5 using the *Symbols* layer.

It is preferred to reference drawing numbers for traceability in the DMS.

8.17.2 Drawing Index or Schedule

A drawing index or schedule may be required for a major group of drawings relating to a portion of equipment to be incorporated into the DMS.

The sheet will consist of appropriate drawing numbers, sheet numbers, and drawing title description listed similar to as shown (inserted as an AutoCAD table).

DRAWING SCHEDULE		
DRAWING No.	SHEET No.	TITLE

Example of Drawing Index or Schedule

The drawing index or schedule may be included on the cover sheet with the locality plan and project details.

8.17.3 Drawing Reference Lists

A drawing reference list shall be shown on drawings where multiple drawings are referenced and an individual drawing index or schedule is not necessary.

The list will consist of appropriate drawing numbers and summary drawing title descriptions similar to as shown (inserted as an AutoCAD table).

REFERENCE DRAWINGS	
DRAWING No.	SUMMARY TITLE

Example of Drawing Reference Lists

8.18 Use of Model and Paper Space

All drawings require the use of the “paper space” and “model space” working environments in AutoCAD.

Under this environment, all drawing geometry must be created in “model space” except for standard drawing borders, scale bars, general notes, drawing reference and material lists, and instrument loop and equipment tables to be created in “paper space”. The drawing geometry created in “model space” will be appropriately scaled (refer to section 8.19) using viewports in “paper space” on the *Vports* layer.

8.18.1 Model Space

All drawing geometry including structures, details, notes and dimensions are to be created at full size (Scale 1:1).

Where the spatial location of model geometry is based on data geographic coordinate system, the geometry will not be moved, rotated or scaled from its original coordinate position.

The standard drawing border may only be inserted into “model space” as a block when the model geometry drawn to full size does not exceed the extents of the drawing border inserted at original size (Scale 1:1). For instance, electrical, process and instrumentation drawings and other unscaled drawings will fall into this category.

Where model geometry, drawn at full size exceeds the extents of a standard drawing border inserted at original size; the standard drawing border shall be inserted in a layout view as described below.

8.18.2 Paper Space

No drawing geometry is to be present in “paper space”.

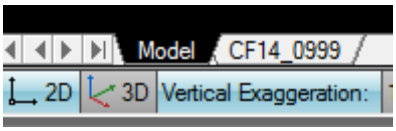
A standard drawing border must be inserted as a block in “paper space” at the insertion point of 0,0 in the bottom-left hand corner along with scaled viewports and scale bars. Use the corresponding size title block for required paper sizes. (Title block must be inserted at 1:1).

“Paper space” may also include general notes, drawing reference and material lists, and instrument loop and equipment tables at a scale ratio of 1:1 as required.

There shall be only one “paper space” layout view per drawing file.

Where multiple layouts reference the same “model space” geometry, the model and each layout must be copied to individual drawing files to represent the above requirement.

The “paper space” will appropriately setup at a scale ratio of 1:1 and named according to the file name e.g. CF14_0999 for drawing number, CF14/0999:



Example of Model Space and Paper Space Tabs

8.19 Scales

Scales to be used in drawings are listed below as shown in Table 18. In some instances there may be a requirement to vary these scale ranges either up and down. The recommended range of scales may be extended in either direction provided that the multiplying factor used to derive the scale is an integral power of 10.

For drawings with multiple scales, the scale in the standard drawing border will be AS SHOWN as per section 8.10. The individual scales will be shown below each detail title.

For drawings not to scale and dimensioning is not shown, the scale in the standard drawing border will be shown as NTS. The individual scales will be shown as N.T.S. below each detail title.

Use scale bars if required to visually determine the scale of the drawing.

Table 18: Drawing Scales

Description	Scale Ratio (for mm drawing units)	Scale Ratio (for m drawing units)
Full Size and Enlargement Ratios	10:1mm 5:1mm 4:1mm 2:1mm 1:1mm	1:1m
Reduction Ratios	1:2mm 1:5mm 1:10mm 1:20mm 1:25mm 1:50mm 1:100mm 1:200mm 1:250mm 1:500mm 1:1000mm 1:2000mm 1:2500mm 1:5000mm 1:10000mm	1:2m 1:5m 1:10m 1:20m 1:25m 1:50m 1:100m 1:200m 1:250m 1:500m 1:1000m 1:2000m 1:2500m 1:5000m 1:10000m 1:20000m 1:25000m 1:50000m 1:100000m 1:200000m 1:250000m 1:500000m
Non-defined Ratio	NTS	NTS
Multiple Scales	AS SHOWN	AS SHOWN

8.20 Dimensioning

Dimensioning style shall be in accordance with AS 1100.101 and HB 7: Engineering Drawing Handbook.

Use AutoCAD dimensioning styles as setup in the Icon Water standard drawing templates, *Water.dwt*. The dimensioning styles are defined by scale ratio and to be used in drawings as required:

Table 20: Dimensioning Styles & Multileader Styles

Icon Water AutoCAD Dimensioning Styles	
Name	**Scale Ratio**
1 to 1	1:1
1 to 2	1:2
1 to 5	1:5
1 to 10	1:10
1 to 20	1:20
1 to 25	1:25
1 to 50	1:50
1 to 100	1:100
1 to 200	1:200
1 to 250	1:250
1 to 500	1:500
1 to 1000	1:1000
1 to 2000	1:2000
1 to 2500	1:2500
1 to 5000	1:5000
1 to 10000	1:10000
1 to 20000	1:20000
1 to 25000	1:25000
1 to 50000	1:50000
Water Standard Text 2.5*	As per viewport scale
Water Standard Text 3.5*	As per viewport scale
Standard AutoCAD Dimensioning Styles	
Standard	1:1

*Annotative dimension styles.

Annotated dimension and multileader styles are to be used wherever possible. All dimensions and multi leaders shall be created in “model space”. Where non-annotative dimensions or multileaders are used the style is to match the scale ratio of the drawing in “paper space”. For instance, if the drawing is at a scale of 1:20 in the “paper space” sheet layout, then the dimensioning style to use is “1 to 20” in “model space”.

With written approval from Icon Water, Dimensions may be created in “Paper Space” where it is not practical to create them in “Model Space”. e.g. complex mechanical layouts.

Under no circumstances will dimensions or multileaders be exploded.

Use the drawing object properties to modify the dimension, in particular change the text override, text position and arrow size properties to suit. All text leaders must be multileaders.

8.21 Asset Data Equipment Numbers and Instrument Loop Numbers

Equipment and instrument loop numbers are plant and equipment asset codes used in operations.

Drawings shall contain asset codes as determined by Icon Water and will be provided by the Asset Data Coordinator. Additional details are provided in the Standard Specification Operation and Maintenance Manuals.

If drawings include equipment numbers and/or instrument loop numbers, the automated equipment and instrument loop numbering tool must be used (internal use only).

The tool is located under the **Hydraulics** pull-down menu as two options:

Table 20: Equipment and Instrument Loop Numbering Tool (internal only)

Menu Option	Layer Name
Equipment Table	Equipment Table
Loops Table	Instrument Loop Table

Select the “Equipment Table” or “Loops Table” menu option and where equipment numbers or instrument loop numbers are contained within the drawing, the tool will automatically create the table. The table will not be created if no applicable numbers are present within the drawing.

The tables will be placed at the insertion point of 0,0 or the bottom-left hand corner of the drawing. The *Equipment Table* and *Instrument Loop Table* layers will be hidden and table(s) must not be exploded. It is acceptable for the numbers to extend outside the table.

The following table is the format of equipment and instrument loop numbers:

Table 21: Equipment and Instrument Loop Number Formats

Equipment Numbers		
Series (E.g. LM)	**Format**	**Example**
	nnnnAA	LM-1160PU
	nnnnAA-XXX	LM-1160PU-PMP
	nnnnAA-XXXn	LM-1160PU-PMP1
	XXXX-nnnnAA	LM-PMP1-1160PU
	nnXX	WP003-04MV
	nnXX-XXX	WP003-04MV-VLV
Instrument Loop Numbers		
Series (E.g. LM)	**Format**	**Example**
	ILnnnn	LM-IL5015
	ILnnnnn	LM-IL50151
	IL-nnnn-XX	LM-IL-501-FE
	IL-nnnnn-XXnn	LM-IL-50151-FE02
	ILnn	WP003-IL02
	ILnn-XX	WP003-IL02-FE

8.22 Modifying Existing Drawings

8.22.1 Modifications to Drawings by Contractors

The contractor shall identify existing drawings to be modified.

Prior to modification of the drawings, the contractor shall advise the Icon Water Project Manager and Drawing Control Officer of drawings required for amendment.

The Drawing Control Officer or representative assigns the drawings under transmittal to the Icon Water Project Team in the DMS.

When drawings are modified the drawing revisions are updated in the standard drawing border as per section 8.9.

Revision clouds and amendment triangles are to be used as per section 8.22.4 to highlight new modifications.

Prior to submission of Work As Executed drawings, the drawing files will follow the drawing completion process at section 8.1.

8.22.2 Transmittals

New drawings and existing drawings for amendment by the contractor will be transmitted by Icon Water via the Secure File Transfer Protocol (SFTP).

8.22.3 Modifications to Drawings by Icon Water Staff

Follow the Icon Water Drawing Management - Drawing Change (Drafting Request) procedure.

8.22.4 Revision Clouds and Amendment Triangles

Revision clouds and amendment triangles will only be used during development and construction at project implementation and execution phases. They must be removed prior to submitting for Work as Executed.

9 Drawing Submission Requirements

Drawings will be submitted for review and acceptance (refer to Drawing Lifecycle Flowchart) at the various project stages, refer to Table 22.

Submission of AutoCAD drawing files (DWG format) and Inventor drawing files (ipt, iam, ipn and idw) is required as early as practical to ensure compliance with this standard specification.

Drawings will not be submitted without an approved Icon Water drawing number as detailed in section 8.5 and these drawing numbers shall be used in all communications with Icon Water.

Table 22: Drawing File Types Required at Project Stages

Project Stage	Design Drawings	WAE Drawings	Vendor Drawings
Concept Design	DWG & PDF	N/A	PDF
Issued For Review	DWG & PDF	N/A	N/A
Issued For Tender	DWG & PDF	N/A	N/A
Issued For Construction	DWG & PDF	N/A	N/A
Work As Executed	N/A	DWG & PDF	PDF

9.1 Drawing Completion

Prior to submission of drawings to Icon Water, all drawing files shall be processed for transfer into Icon Water's DMS via the following method:

1. BIND all external reference files (x-refs).

   Icon Water will not accept attached x-refs within drawings.

2. PURGE to remove all unused definitions including blocks, layers, text styles and linestyles.
3. Remove all entities in "model space" that are not part of the final design.
4. Remove all entities in "paper space" that is outside the sheet layout.

   (steps 5-7 for Externally produced drawings)

5. Provide a hard copy plot of the drawing(s) on request.
6. Ensure all drawings shall be supplied virus free.
7. Submit drawings to Icon Water as per section **9.2**.

9.2 Submitting Drawings using SFTP Portal

All drawing files and related information (including attached raster files and PDF renditions) in the file naming conventions defined at section 8.6 will be submitted to the Icon Water SFTP Portal.

The contractor shall submit a drawing transmittal document defining all files submitted to Icon Water.

9.2.1 Supply of Design Drawings

In the initial stages, design drawings will be submitted to the project team for review to ensure drawings comply with Section 8 of this document and the conditions of the tender contract.

Submission of Adobe PDF and AutoCAD DWG files is required as per Table 22.

The Icon Water Project Officer and Drawing Control Officer in consultation shall review these drawings and provide feedback regarding any quality issues.

9.2.2 Supply of Work-As-Executed Drawings

All Work-as-Executed (WAE) drawings shall accurately represent the completed works constructed or installed. The preparation of WAE drawings requires the amendment of the approved or final issue design drawings.

Each WAE drawing will be authorised by the Icon Water Project Officer approving the final construction or installation.

Refer to the other Icon Water Water Supply and Sewerage Standards and Guidelines for full WAE requirements.

9.2.3 Supply of Vendor Drawings

Vendor drawings are fabrication or shop drawings that are produced as contract documents or standard manufacturer's drawings that define in further detail the constructed or installed completed works.

Vendor drawings shall be supplied by manufacturers or third parties and may not necessarily conform to this document unless varied by the conditions of tender contract.

A vendor drawing is a drawing produced that defines the detail of equipment, steelwork, instruments and other materials that are delivered to site fully constructed or assembled*. These drawings do not generally comply with the Icon Water Drafting Standards and therefore must be dealt with differently when stored in the Icon Water drawing management system.

*Note: while structural steelwork or mechanical ducting are generally assembled onsite the vendor or shop drawings define the individual members that are premade prior to being delivered to site for assembly.

A shop drawing is a drawing or set of drawings produced by the contractor, supplier, manufacturer, subcontractor, or fabricator. Shop drawings are typically required for prefabricated components.

Note: Contractor and subcontractor drawings must conform to the requirements of this document and conditions stipulated in the tender contract.

10 Standards Review

All contract drawings will be supplied to Icon Water for review by the Project team.

The drawings will be reviewed and assessed for conformance to this document and associated tender contract requirements. Documentation shall be provided to inform that drawings have been reviewed and identify quality issues concerning these drawings.

Failure to conform to the requirements of this document will result in implications to the drawings that require amendment and be re-supplied at the expense of the contractor.

11 Final Project Handover (Completed by Icon Water Staff)

Final project handover is achieved following final submission and publishing of drawings in Icon Water systems, acceptance by relevant persons and completion of the project handover certificate.

The project handover certificate determines that stated and agreed operations and maintenance requirements for projects have been satisfactorily addressed and the project can now be archived.

12 Data Ownership and Copyright

12.1 Icon Water Drawings

The information contained within the drawings, maps, documents, calculations, information, instructions and associated electronic files shall remain the property of Icon Water and shall not be copied or used for any other purposes without express written permission from Icon Water.

12.2 Vendor Drawings

Copyright and ownership of all vendor or manufacturers drawings, maps, documents, calculations, information and instructions can remain the property of manufacturer. Icon Water must have free use and ownership of design and WAE drawings it has submitted for a project or been given in regards to Gifted Assets.

12.3 Copying Vendor Drawings

Icon Water shall be free to copy and use all vendor or manufacturers' drawings, maps, documents, calculations, information and instructions for its own internal use.

12.4 Water, Sewerage and Non-Drinking Water Infrastructure

All water, sewerage and non-drinking water related infrastructure data shall become the property of Icon Water.

12.5 Cadastre

Cadastral information supplied by the Environmental Planning Directorate (EPD) remains the property of the A.C.T. Government and shall not be copied or used externally from Icon Water without express written permission from EPD.

13 References

Drawing Management System User Manual

Drawing Management – Overview

Drawing Management – Drawing Numbering Structures/Drawing Title Construction

Drawing Management – Drawing Input – New Drawing Registration

Drawing Management – Drawing Change (Drafting Request)

13.1 Australian Standards

AS 1100 – Part 101: General Principles of Technical Drawing, 1992

AS 1100 – Part 301: Engineering Survey and Engineering Survey Design Drawing, 1984

AS 3883: Computer Graphics – CAD – Guide for Structuring of Graphic Information, 1991

SAA HB 7: Engineering Drawing Handbook, (R2014)

13.2 Other references

Water Supply and Sewerage Standards (WSSS)