

Specification
For
CAD Drafting Standards

Pr9080



Unitywater

Pr9080 - CAD Drafting Standards

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1. General

- 1.0.1 All drawings prepared for Unitywater shall be in AutoCAD drawing file format.
- 1.0.2 Methodology and practice in relation to AutoCAD usage shall conform to this document.
- 1.0.3 It is assumed that the reader of this manual has a working knowledge of AutoCAD and understands the AutoCAD terms used. Please refer to the **AutoCAD Users Guide** or online help files within AutoCAD for information on terms used in this manual.
- 1.0.4 Changes to this Specification shall be made only by the appointed Unitywater drafting manager or nominated delegate.
- 1.0.5 The Designer should be aware that the contract documents for the work under contract may vary the requirements stipulated in this document.
- 1.0.6 Unless specified otherwise by this document, drawing practice shall conform to the relevant Australian Standards (AS-1100, AS-1101, AS-1102, AS-3702, AS-4383, AS-60417, etc.) and HB7: Engineering Drawing Handbook issued by Standards Australia.
- 1.0.7 All abbreviations and units shall be in accordance with AS 1000. Dimensions shall be in metric units.
- 1.0.8 All Civil, Mechanical and Structural drawings shall be prepared as A1 size drawings using the relevant supplied Unitywater AutoCAD drawing template file and the title block information entered in accordance with this document.
- 1.0.9 All Electrical drawings shall be prepared as A3 as per Unitywater Electrical Templates and standard drawings.
- 1.0.10 All drawings issued by Unitywater in electronic format shall be as PDF unless approved by a Unitywater representative.
- 1.0.11 Any electronic drawing files provided to the designer by Unitywater for use in preparation of the design and/or work as constructed (AC) drawings shall remain the copyrighted property of Unitywater and shall not be used for any purpose other than preparation of the design and/or As Constructed drawings for the project/ projects under contract.
- 1.0.12 Unless varied by the contract documents, all engineering drawings prepared for Unitywater shall conform to the requirements of this document.
- 1.0.13 The Contractor shall modify non-compliant drawings at their own cost.
- 1.0.14 Final project drawings clearly marked 'As Constructed' and duly signed as required shall be issued to Unitywater at the completion of the project both in A3 pdf files (landscape) as well as in AutoCAD format with all xref and OLE files.
- 1.0.15 This document does not cover the preparation of ADAC As-con plans for the provision of developer contributed water and sewerage pipeline infrastructure. ADAC 'As-constructed plans' shall comply with the Unitywater's *Specification for As Constructed Information* (Pr9078).

Note:

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It is a mandatory requirement of Unitywater that all drawings are issued in AutoCAD format on completion of Design, For Construction and As Constructed work.

It is mandatory that Consultants supply to Unitywater drawings in AutoCAD format drawings during the design stage for assessment of compliance with required standards within this document.

2. Setting up Drawings

2.1 File Naming Convention for Sewage Treatment Plants

- 2.1.1 The file naming convention for equipment located at sewage treatment plants shall be in accordance with the Unitywater standard document numbering system for STP's UWDSTD-D-PX-0001. This document numbering system is accompanied by a training presentation that can be provided by the Major Projects team.

2.2 File naming convention for all other assets.

2.2.1 Drawing Number

- 2.2.1.1 All drawings shall be on the approved Unitywater title block and contain a unique drawing number as issued by Unitywater. The CAD and PDF File shall be provided in the following format:

W8443-1

UW Number

2.2.2 Drawing Environment

- 2.2.2.1 All drawings, other than electrical schematics, process & instrumentation drawings, and other similar unscaled drawings, shall be supplied as AutoCAD files utilising 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 and displayed in 'paper space' using suitably scaled AutoCAD 'Viewports'.

Note:

Survey file units shall be 1 unit is equal to 1 metre, Detail drawings shall be 1 unit is equal to 1mm.

- 2.2.2.2 Where the 'paper space/model space' feature of AutoCAD is utilised, the dimensions, labels and annotation text shall be scaled to suit and inserted in model space. However, the drawing frame, general notes, reference drawing list, material list, pipe work schedule and other notation shall be inserted as 'paper space' entities at a scale of one to one on the drawing layout.
- 2.2.2.3 Electrical schematic drawings, process and instrumentation drawings and other similar unscaled drawings may be supplied entirely in 'model space' (i.e. 'Tilemode' one) with the drawing form, notes, dimensions, etc. scaled appropriately.
- 2.2.2.4 In order to ensure AutoCAD references metric line types, pattern hatches, etc. the AutoCAD system variable 'Measurement' shall be set to '1'.

2.2.3 Drawing Sets

- 2.2.3.1 Unitywater requires all sets of drawings to be set out in logical order.

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2.2.3.2 All sets shall contain a front sheet drawing containing Drawing Index, Pipeline Layout and Locality plan and a separate drawing with project specific Notes.

2.2.4 Typical Drawing Index

2.2.4.1 The total number of drawings is dependent on size and scope of the Contract.

2.2.4.2 A typical drawing index is as follows:

W8443-1 DRAWING INDEX, PIPELINE LAYOUT & LOCALITY PLANS.

Drawing index *lists all drawings in contract set.*

Locality plan with pipeline layout overlaid using Internet map as base.

W8443-2 NOTES

General notes, Structural notes, Construction notes etc. relevant to project including references to standards associated with the extent of works.

W8443-3 PIPELINE ALIGNMENT PLAN & SETOUT DETAILS

Overview of extent of works in plan view. including Survey Setout Table. Survey Station Table and Surveyor's name, contact and file details

W8443-4 PIPELINE LONGITUDINAL SECTION OVERVIEW

Profile of full long section (Used to assist in understanding the full hydraulic profile versus geographical profile)

W8443-5 PIPELINE PLAN & LONGITUDINAL SECTION SHEET 1 OF 5

W8443-6 PIPELINE PLAN & LONGITUDINAL SECTION SHEET 2 OF 5

W8443-7 PIPELINE PLAN & LONGITUDINAL SECTION SHEET 3 OF 5

W8443-8 PIPELINE PLAN & LONGITUDINAL SECTION SHEET 4 OF 5

W8443-9 PIPELINE PLAN & LONGITUDINAL SECTION SHEET 5 OF 5

Drawings to show pipe alignment plan top of sheet and corresponding longitudinal section bottom of sheet. Preferable scales are: 1:250H 1:50V (A1) Gravity Sewers, 1:500H & 1:100V (A1) Watermains and Sewer Rising Mains All longitudinal sections to have chainage left to right with plan using viewport rotation corresponding and to the scale of the longitudinal section. For Gravity Sewers, long section shall have pipe flow direction from right to left; i.e. lowest point in pipeline at the left side of the drawing. For pressure mains chainage direction is from left to right in the flow direction.

W8443-10 TYPICAL DETAILS SHEET 1 OF 4 – TYPICAL TRENCHES & SCOUR DISCHARGE PUMP-OUT SUMP

W8443-11 TYPICAL DETAILS SHEET 2 OF 4 – WATERMAIN CONNECTION ACCESS PIT (CH 721.154)

W8443-12 TYPICAL DETAILS SHEET 3 OF 4 – SLUICE VALVES & AIR VALVES

W8443-13 TYPICAL DETAILS SHEET 4 OF 4 – THRUST BLOCKS – VERTICAL & HORIZONTAL BENDS

W8443-14 AS CONSTRUCTED SURVEY.

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At completion of the construction a detailed survey file should be created should be added to the drawing set. Showing only property boundaries, new assets built and connection points to existing assets.

2.2.5 Survey Drawings provided for Design

2.2.5.1 All drawings created for base design shall be begin at number 100 of the set, so as not to clash with the numbering format as described in previous section, as set out below:

W8443-100.dwg

UW Number

2.2.5.2 This drawing forms the base for design set out and must comply with Unitywater layer and colour conventions to allow use by designer's with minimum modification

2.2.5.3 All digital data supplied by the survey consultant shall become the property of Unitywater. It shall not be used, copied or reproduced by the consultant for any other purpose without written approval from Unitywater.

2.2.5.4 All data submitted to the Principal shall be in accordance with the following requirements:

- The Horizontal Datum of all engineering surveys shall be MGA Zone 56 (Map Grid Australia) 3rd order accuracy (not based on DCDB co-ordinates) with appropriate scale factor, using RTK or Static GNSS (Global Navigation Satellite System).
- The Vertical Datum for all levels will be AHD (Australian Height Datum) 3rd Order accuracy.
- Production of both Cadastral and Engineering survey data / plans / drawings.
- Engineering Survey data to be:
 - DWG file format and include on individual layers, Points 3D, Lines 2D, Symbols, 3D triangle lines & 3D Faces, 3D contours to 0.5m interval including contour labels;
 - The supplied data should also include a separate DXF file of 2D contours at 0.5m interval including labels and a separate DWG file of pothole data. Layers, Linetypes and colours as per this document;
 - CSV file format of all points and a separate CSV file of potholing data. (CSV format: Point No., Easting, Northing, Height, Code)
 - Particular features to be located shall be, all existing aboveground/surface features, full designation of all existing Underground Services including points connected with appropriate linetypes and Trees >200mm girth measured at 1.3m above ground including canopy width;
 - Include minimum 3 control points;
 - Code, Height and Point number to be in text format in individual layers.

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2.2.6 Longitudinal Sections.

2.2.6.1 Unitywater drawings containing Longitudinal Sections shall have tables in the following format.

2.2.6.2 For pressure mains (water and rising mains):

Depth to Invert
Design Invert Level
Natural surface level
Chainage

2.2.6.3 For gravity sewers:

Manhole Finished Surface Level (FSL)
Depth to Invert
Design Invert Level
Natural surface level
Chainage

2.2.7 Electrical drawing requirements

2.2.7.1 All electrical schematic diagrams are to be generated and submitted in model space ONLY. Other electrical drawings such as switchboard arrangements are acceptable in either paper or model space.

2.2.7.2 All site plans must be submitted utilising paperspace (for title block) and correctly geo referenced lot plan in model space of the drawing.

2.2.7.3 In keeping with AS3000 AS/NZ 3000:2007 (Electrical wiring rules) any time a project contains any underground electrical conduits of ANY rating, a separate site plan MUST BE created showing all, but not limited to, electrical conduits, switchboards, pits earthing locations and isolation points and associated electrical infrastructure. These plans are to be accurate to enable future locations.

2.2.8 Materials list

Note:

Projects containing assemblies must have itemised Materials list in standard format as per AS 1100.

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2.2.8.1 Typically Item numbered Bubbles and corresponding Table format list.

2.2.8.2 Tables are to contain the following fields:

Item Number	Quantity	Description	Length	Material	Standard
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2.2.8.3 Alternatively:

Item Number	Description (including material and standard)	UNIT	Quantity
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2.2.9 Plan Drawings

2.2.9.1 All plan drawings to have a North orientation to top of the sheet.

2.2.9.2 All levels should be reduced to Australian Height Datum (AHD). Azimuth should be to MGA (Zone 56). Survey should be on true MGA not based on DCDB co-ordinates. Drawings should detail PSM's adopted along with Easting's, Northing's and levels. The Surveyor's name and contact details should be detailed on the drawings

2.2.10 Drawing Title Blocks

2.2.10.1 All drawings are to be produced on the Unitywater title block. There is an allowance for the Consultants Logo and Information on the provided title block (this is the blank space to the left side the Unitywater Logo. Consultants logo and Information should not dominate the drawing).

2.2.10.2 The title block shall be inserted on paper space at insertion point 0, 0.

2.2.10.3 No scaling of the title block is allowed.

2.2.10.4 The title block shall have an attributed block of text for the title. This can be accessed by using the command 'DDATTE'. **DO NOT EXPLODE THIS BLOCK.**

2.2.10.5 The title block sheet shall be in A1 Format allowing sheet print scale of 1:1 on A1 plot sheets and scale 1:2 at A3 size.

2.2.10.6 Title Block should not be renamed exploded or have any attribute tags modified.

2.2.10.7 The Title Block should never be converted to an X-reference file.

2.2.11 Naming External Reference Files

2.2.11.1 External reference files ('xref' files) are used for producing issuable drawings utilising paper space.

2.2.11.2 When 'xref' files are required, they should be named using part of the job code with an 'x' as a prefix and an alphanumeric suffix as a unique identifier.

2.2.11.3 For example, an external reference job created of the Inlet works at Maroochydore would be named:

Xmar INLET

Where:

- 'X' – represents external reference
- Mar – is part of the job code
- Inlet – up to 6 digit ID code for item being drawn.

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- 2.2.11.4 By having the 'x' as a prefix, this allows the 'xref' codes to be grouped automatically by the Operating System of your PC to the end of the directory, and identifies that file is an external reference used in the drawing set.
- 2.2.11.5 Note that AutoCAD does not like blocks with long file names especially if they are nested within other external reference files. Block names (other than Xref) should be between 8 to 10 characters.

2.2.12 External File Naming conventions

- 2.2.12.1 If the drawings received from Vendors are to form part of a drawing set then these are required to be provided using the approved project title block with appropriate unique drawing numbers.

2.2.13 Standard Layer Naming

- 2.2.13.1 Because drawing system uses external reference files for the creation of drawings in most cases then we do not use the bylayer method of colour and linetype separation, which creates layers specific to a particular colour and linetype.
- 2.2.13.2 Layer names in the system are created using a unique discipline code as the initial prefix letter followed by a subsequent unique name.

Table 1 - Layer Names

Discipline Code	Number	Unique Number
A – Architectural	01 – 99	Any name that identifies the layer to the use (i.e.: elec. for electrical, RAS for Ras lines, etc.).
G – General		E.g. TITLE SHEET, NORTH ARROW
C – Civil		E.g. LS HORIZONTALS; LS VERTICALS; AIR VALVE
S – Structural		E.g. CONCRETE; REINFORCEMENT
M – Mechanical		E.g. PUMPS
E – Electrical		E.g. SWITCHBOARDS; CONDUITS
I – Process		E.g. AIR; CHEMICAL DOSING; RAS for Return Activated Sludge
P – Piping		E.g. Water and Sewer pipework
T – Tankage		E.g. CHEMICAL STORAGE; etc.
X – Existing/Survey		E.g. any infrastructure or property that exists prior to construction.

- 2.2.13.3 Layer names using the above table should look something like the list below:

C01-WALLS	Civil layer walls
P01-RAS	Piping layer RAS pipes
XW-01-ExWater Pipe	Water layer Existing Water Pipes
XS-01-ExMH	Sewer layer Existing Manhole

- 2.2.13.4 The above list is an example of the way layers should be named. This is convenient because AutoCAD will group layers by discipline code so they are easier to read. Also layers are named according to what they contain.

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- 2.2.13.5 For convenience Unitywater supplies template files that contain preconfigured layers, plot settings, text styles, dimension styles and paper space settings.
- 2.2.13.6 New layers created are based on “sample layers” in Template for lineweight/ linetype with naming identifiable to what the layer contains

2.2.14 List of Layers Supplied in Civil Template

(Template file named 'UW TEMPLATE.dwt')

Table 2 - Layers for Civil Template

Layer Name	Colour	Line Type	Comment
0	WHITE	CONTINUOUS	Used for block creation. Refer Note.
1C	Red	CONTINUOUS	Outlines of existing items visible.
1D	Red	DASHDOT	Outlines of existing items invisible.
1H	(9) Light Grey	HIDDEN	Hidden details of visible items.
1P	(9) Light Grey	PHANTOM	AS REQUIRED FOR REPRESENTATION.
2C	Yellow	CONTINUOUS	MINOR ITEMS.
2CL	Red	CENTRELINE	ALL CENTRE LINES.
2H	White	HIDDEN	MINOR HIDDEN DETAIL.
2HH	White	HIDDEN2	SUB MINOR HIDDEN DETAIL.
2P	White	PHANTOM	AS REQUIRED FOR REPRESENTATION.
3C	Cyan	CONTINUOUS	MAJOR DETAIL REPRESENTATION.
5C	Green	CONTINUOUS	MAJOR DETAIL REPRESENTATION.
7C	Blue	CONTINUOUS	MAJOR DETAIL REPRESENTATION.
DIM	Yellow/RED	CONTINUOUS	DIMENSION TEXT/ LINEWORK.
HATCH	(8) Dark Grey	CONTINUOUS	HATCH.
REVISION	Red	CONTINUOUS	REVISION TRIANGLES AND CLOUDS.
TEXT-2	Y	CONTINUOUS	TEXT 2.5.
TEXT-3	Cyan	CONTINUOUS	TEXT 3.5.
TEXT-5	Green	CONTINUOUS	TEXT 5.
TEXT-7	Blue	CONTINUOUS	TEXT 7.
TEXT-BORDER	White	CONTINUOUS	Frozen for printing purposes.
VIEWPORTS	120 (Pale Cyan)	CONTINUOUS	Visible but set to not print.

* Note layer naming convention used in template. Layer name refers to pen weight/colour and linetype.

2.2.15 List of Layers Supplied in Electrical Template

(Template names are A3 UW ELEC TITLE.dwt and A3 UW ELEC TITLE WITH GRID.dwt)

Table 3 - List of Layers Supplied in Electrical Templates

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Layer Name	Colour	Line Type	Comment
E-TEXT- 25	Cyan	CONTINUOUS	TEXT electrical, weighting 0.25mm
E-TEXT- 35	Yellow	CONTINUOUS	TEXT electrical, weighting 0.35mm
E-TEXT- 50	Red	CONTINUOUS	TEXT electrical, weighting 0.50mm
E-TEXT- 70	Blue	CONTINUOUS	TEXT electrical, weighting 0.70mm
E-COMPONENT- 25	Cyan	CONTINUOUS*	Graphical element electrical, weighting 0.25mm
E-COMPONENT- 35	Yellow	CONTINUOUS*	Graphical element electrical, weighting 0.35mm
E-COMPONENT- 50	Red	CONTINUOUS	Graphical element electrical, weighting 0.50mm
E-COMPONENT- 70	Blue	CONTINUOUS	Graphical element electrical, weighting 0.70mm

* Other acceptable line types are Hidden to denote shielding or links. Dashdot or Centre to denote a boundary line or enclosure

2.2.16 Use of Layer 0

2.2.16.1 Every drawing includes a layer named 0. Layer 0 cannot be deleted or renamed. It has two purposes:

- Ensure that every drawing includes at least one layer; and
- Provide a special layer that relates to controlling colours in blocks (refer section 2.2.29 'Blocks and Block creation').

2.2.17 Standard Colours

2.2.17.1 For AutoCAD – Civil UW A1-A3.ctb:

Table 4 - Standard AutoCAD Colours to be used for Civil Drawings

Colour No.	Colour	Line Thickness (at A1 size plotted)	Line Thickness (at A3 size plotted)
1	Red	0.18	0.10
2	Yellow	0.25	0.13
3	Green	0.50	0.25
4	Cyan	0.35	0.18
5	Blue	0.70	0.35
6	Magenta	0.10	0.05
7	White	0.25	0.13
8	Dark Grey	0.05	0.00
9	Light Grey	0.05	0.00
10	Dark Red	1.00	0.50
253	Light Grey	0.09	0.05

2.2.17.2 Standard colours are to be in accordance with the following colour schemes.

2.2.17.3 Line thicknesses will change depending on plot size (i.e.: A1, A3, A4).

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Note: These colours are default as specified by Unitywater.

2.2.17.4 For AutoCAD – Electrical UW_Elec.ctb:

Table 5 - Standard AutoCAD Colours to be used for Electrical Drawings

Colour No.	Colour	Line Thickness
1	Red	0.35
2	Yellow	0.25
3	Green	0.15
4	Cyan	0.15
5	Blue	0.50
6	Magenta	0.13
7	White	0.15
8	Dark Grey	0.15
9	Light Grey	0.15
10	Dark Red	0.15

2.2.18 Plot Configuration

- 2.2.18.1 All drawings must be created using the Layer control and colours defined in the standard and print/plot to the Unitywater plot configuration.
- 2.2.18.2 It is a requirement that the supplied AutoCAD plot style tables supplied in this standard be used to ensure compliance with the above. UW A1-A3.ctb (Civil) and UW_Elec.ctb (Electrical)
- 2.2.18.3 When creating PDF files utilise AutoCAD DWGtoPDF plot function to ensure layers control is maintained.
- 2.2.18.4 Plot or scans to PDF will not be accepted.
- 2.2.18.5 The line types representing design works shall be prominent and at least one or two thicknesses greater than lines for property boundaries.

2.2.19 Text

- 2.2.19.1 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	0.8 to 1.0
Obliquing Angle	0
Backwards	N
Upside-down	N
Vertical	N

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- 2.2.19.2 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 or a font supplied in the Unitywater ADAC As-Constructed package and the associated text style name shall match the font name.
- 2.2.19.3 Note text width between 0.8 to 1.0 is acceptable providing the width use is constant is common for the full set of project drawings.
- 2.2.19.4 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 & section titles, minor headings etc.
7mm	0.7mm	Major view & section titles, Major headings etc.

- 2.2.19.5 Fonts shall remain legible and unambiguous in a direct photocopy print in a reduced copy. Fonts are to be legible at A3 size.
- 2.2.19.6 A minimum text height accepted for all text is 3mm (A1).
- 2.2.19.7 All characters in the drawing shall be kept clear of lines. Where a line precludes this requirement, the line may be interrupted sufficiently (e.g. break the line work) to accommodate the characters.
- 2.2.19.8 Generally follow the Australian Standard AS-1100.101-1992 Technical drawing Part 101: General principles.

2.2.20 Dimensioning Style

- 2.2.20.1 Dimensioning style shall be in accordance with the National Standard AS-1100 and HB7: Engineering Drawing Handbook issued by Standards Australia.
- 2.2.20.2 The AutoCAD dimension style used shall be as defined in the standard drawing template files (Electronic).
- 2.2.20.3 Each dimension shall be a single AutoCAD entity. "Exploded" dimensions are not acceptable.
- 2.2.20.4 Generally Line weight for Leaders, extension lines and dimension lines are one thickness lighter than dimension text thickness.

2.2.21 Standard Linetypes

- 2.2.21.1 Line types shall only be a standard AutoCAD linetypes or a linetype supplied by Unitywater.
- 2.2.21.2 The line types representing 'As Constructed' works shall be prominent and at least one or two thicknesses greater than lines for property boundaries and the like.

2.2.22 Unitywater Linetypes

- 2.2.22.1 The line type of the layer on which each AutoCAD drawing entity resides shall determine the entity's line type. This shall be achieved by setting the AutoCAD entity's 'Linetype' property to 'Bylayer'.
- 2.2.22.2 Linetypes can be found in the standard ACAD.LIN file which is standard in AutoCAD.

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2.2.22.3 There are also nonstandard files called SERVICES.LIN and UW.lin which contains linetypes as noted below.

Table 6 - Services Linetypes

Pipe Tag	Service Designation	Pipe Tag	Service Designation
AA	Aeration air	OL	Condensed Oil
AS	Activated Sludge	OV	Oil Vapour
AD	Alum Dosing	PD	Phosphorus Dosing
BW	Backwash Water	PE	Primary Effluent
BO	Bore Water	PS	Primary Sludge
CA	Compressed Air	PT	Primary Treated Water
CD	Caustic Dosing	PW	Potable Water
CG	Chlorine Gas	PY	Poly Dosing
CS	Chlorine Solution	RA	Return Activated Sludge
DE	Disinfected Effluent	RE	Reticulated Effluent
DN	Drain	RS	Raw Sludge
DS	Digested Sludge	RL	Return Liquor
FA	Foul Air	SA	Scour Air
FE	Filtered Effluent	SP	Septage
FI	Filtrate	SU	Supernatant, Subnatant
FR	Filter Rinse	SE	Secondary Effluent
GR	Grit	TS	Thickened Sludge
ML	Mixed Liquor	WS	Waste Activated Sludge
ND	Nitrogen Dosing	WM	Waste Mixed Liquor
NP	Nitrogen Purge	WR	Water (Reaction)
-- // --	Pneumatic line		

2.2.22.1 'UW.LIN':

Roadwork's and Earthworks	
Kerb_channel	Drainage
Kerb_median	Stormwater1
Bitumen edge	Stormwater2
Gravel	Subsoil 1
Crown	Subsoil_
Batter	Sidedrain
Bank_top	Tabledrain
Bank_btm	

Services – Utilities, etc.

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Drainage,	Ohelec (overhead electricity)
Stormwater,	Ohtel (overhead telephone)
Roofwater	Electrical,
Irrigation	Elect conduits,
Sewer,	Telstra, --- T ---T ---
Sewer_rising_main,	Optic_fibre, --- OF --- OF ---
Water_service_conduit	Coaxial, --- CX --- CX ---
Water,	Optus, -----O-----
Water_dia100,	Optus_vision, --- OV --- --
Water_dia150	Conduit, --- C --- C --- C ---
Water_dia225	Gas, --- G --- G --- G ---
Water_dia300	Air, --- A --- A --- A ---

Pavement Markings	
Giveway	Special_park,- - - - -
Continuity	Ped_xing,
Lane	Rrpm_lane,
Separation,	Rrpm_separation,
Pedestrian	Rrpm_barrier,
Turn_line	Rrpm_broken,
Barrier, =====	Rrpm_chevron,
Broken, broken on one side barrier line on other	

Fences, etc.	
Fence	Log Rail
Fence Acoustic	Handrail
Guardrail	

Miscellaneous	
Acquisition,	Retaining wall
Building,	Rock outcrop
Bike route	

Vegetation	
Treeline	Grassed channels
Hedge	Grassed filter strips
Environmental	Limit_of_clearing
Batter chute (temporary)	Reinforced grassed channels

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Catch drain	Rock lined channel
Diversion channel	Rock_mattress_channel,
Drop pipes	Sediment fence
Geosynthetic-lined channels	Straw bale sediment fence

2.2.23 Standard Scales

2.2.23.1 Standard scales for all drawings done electronically in AutoCAD.

2.2.23.2 Standard scales are listed below:

1:1	P & ID's, sketches, Figures
1:2	Structural, Mechanical & Piping Details
1:2.5	Structural, Mechanical & Piping Details
1:5	Structural, Mechanical & Piping Details
1:10,1:20,1:25	Sections, Details
1:50	Architectural & structure layouts
1:100	Site layouts
1:200	Site layouts
1:250	Site layouts/long sections
1:500	Site layouts/long sections
1:1000	Site layouts
1:1250	Site layouts
1:2000 to 1:25000	Key plans/locality plans

2.2.24 Revisions

2.2.24.1 All drawings must indicate the current status of revision in both the revision table and status block (provided beside the drawing number) on the title block.

2.2.24.2 The format for revision follows.

2.2.25 Revision Format (Letter)

2.2.25.1 The first issue of a drawing is always Revision "A" and is usually the following as per the standard descriptions for certain important revisions:

Letter Category	A – Z, AA – etc.
"Preliminary Issue"	First Issue
"Issued for Review"	Issued to Unitywater Project Manager/Engineer for Design Review
"Issued for Information"	Issued for information only.
"Issued for Tender"	Issued "For Tender", but "not for Construction"

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2.2.26 Construction Issue (Number)

- 2.2.26.1 When a drawing has been checked post tender, it is then 'issued for construction'. The number '0' is to be used when issuing a drawing 'For Construction'. This copy becomes the 'wet' signature master. When this has been signed by all relevant parties, the drawing may be released for construction after all names of signatories and dates are typed into the relevant cells, checked approved, etc. of the electronic title block.
- 2.2.26.2 All subsequent revisions to construction issue are to be numbered in order from 1 upwards and a general description of the changes made to the drawing is included in the description section.

2.2.27 Revision Triangles and Clouds

- 2.2.27.1 After construction issue, subsequent revisions are to have revision clouds and triangles highlighting changes made to the drawing in each revision.
- 2.2.27.2 The changes made should be clouded and the triangle added inside the cloud. The revision triangle is an attributed block so the number can be changed using 'DDATTE' command (attribute edit).
- 2.2.27.3 For each subsequent revision that is done, the changes are made to the drawing, the previous clouds are erased and new clouds and revision triangles with new revision numbers are added to the drawing and the drawing is issued as normal. Previous revision triangles are retained on the drawing.

2.2.28 'As Constructed' Drawings

- 2.2.28.1 The last revision for a particular drawing is the 'As Constructed Issue'.
- 2.2.28.2 After a drawing has been edited and changed to 'As Constructed' status, all revision clouds and triangles are removed.
- 2.2.28.3 Refer to *Unitywater Specification for As Constructed Information (Pr9078)*.

2.2.29 Blocks and Blocks Creation

- 2.2.29.1 If a new block is required to be created then it should be created on layer '0' (zero) with colour and line type of the entities within the block set to 'byblock'. This allows the blocks colour & line type to be manipulated when inserted into a drawing. Also if blocks are always created on layer 0, then layers in drawings can be turned on and off without unwittingly losing information.
- 2.2.29.2 As per section 2.2.29 blocks should always be created on layer 0.
- 2.2.29.3 Assembly drawings or connection details should be created by the use of standard dimensionally correct blocks. All block should be named in a convention that allows clear identification. For example, a DN100 DICL flanged 90 degree bend elevation would have a block name "db100FF90e or db100FF90ep for a plan view.
- 2.2.29.4 The use of pasting as a block instead of inserting a block is not an acceptable drafting practice as the block name inserted has no logical name or control point (insertion). Blocks inserted by this method are considered anonymous blocks creating names such as "A\$C32481BD3"

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2.2.30 Use of Groups

- 2.2.30.1 The use of groups within AutoCAD should only be used for creating a group of components in an assembly.

This is particularly useful in mechanical assemblies such as bolted assemblies including multiple blocks as a group. In most cases the creation of 'groups' in infrastructure drawings would not be acceptable. The practice of grouping of lines to create features that 'look like' blocks will not be accepted.

3. Use of 'Paperspace'

3.1 External References

- 3.1.1 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.
- 3.1.2 XREF's can be inserted as Overlays or as Attachments. That choice will affect the behaviour of the drawing where they are inserted.
- 3.1.3 Overlay:
- i. Inserting a drawing A as an overlay in drawing B is the equivalent of just allowing that external reference A to be seen in the current drawing B. The external reference does not become part of that drawing. When inserting drawing B in another drawing, called C, A will not appear.
- 3.1.4 Attachment:
- i. Attachments work the opposite way. An external reference inserted as an attachment becomes part of the drawing where it is inserted. In this case, drawing A would become part of Drawing B when inserted as an attachment. They would still remain two separate drawings, but any time we'd attach drawing B in let's say drawing C, drawing A would be attached too since it is "part" of drawing B.
- 3.1.5 Xref drawings of structures typically do not contain text.
- 3.1.6 'Xref' drawings can be nested, which means one 'xref' can be attached to another 'xref' which can then be attached to a drawing.
- This is particularly useful when arranging structures on a site layout. Each structure as an individual 'xref' is attached to the site 'xref' and positioned according to design requirements and then the site 'xref' is attached to another drawing with a drawing title sheet and drawing number to create a site layout drawing.
- Other individual structure drawings can be created using the original structure 'xref' and appropriate scales. Any changes to individual structures automatically reflect in other drawings that have that 'xref' attached.
- 3.1.7 Drawings may also be prepared utilising a layout tab for individual drawings. This means that an individual file may contain a number of drawings. In this instance the file should be named to indicate a multi drawing file.
- 3.1.8 All X-reference files should be created and saved relative path to the drawing file.
- 3.1.9 *Note:* 'paperspace' and xref files are the preferred method of drawing, but are not always applicable (i.e. P & ID's) so model space drawings can be utilised.

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4. Clean-up of Completed Drawings

- 4.0.1 Prior to submission of final drawings to Unitywater for archiving, all drawing files shall be edited to remove all entities which are not part of the final design.
- 4.0.2 Details used in the development of the drawing but which are not part of the final design shall be removed.
- 4.0.3 All drawings shall also be purged to remove all irrelevant blocks, layers, text styles, etc. through use of the AutoCAD 'Purge' command.
- 4.0.4 The final drawings shall also be checked for database errors using the AutoCAD 'Audit' command and any encryption or passwords removed.

5. Summary

- 5.0.1 Drafting Standards:
 - i. All drawings shall be on the approved Unitywater title block;
 - ii. All drawings shall be created A1 full size (paper space scale 1:1 stat).but plotted at A3 1:2 scale (PDF);
 - iii. All drawings shall be drawn at a suitable scale to be plotted at half scale (A3) and still be legible and at a workable scale (i.e. 1:5, 1:10, 1:25, 1:50, 1:100, 1:250, 1:500, 1:1000, 1:2500 at A1 preferred);
 - iv. All drawings shall have a unique drawing number;
 - v. All drawings must have a revision number;
 - vi. All layers should have the line weight set to the intended plot thickness even if plotting is controlled by colour;
 - vii. All drawings must plot correctly using Unitywater plot .ctb file;
- 5.0.2 AutoCAD line colour to line weight table:
 - Red 0.18
 - Yellow 0.25
 - Green 0.5
 - Cyan 0.35
 - Blue 0.7
 - Magenta 0.1
 - White 0.25
 - Dark Grey 0.05
 - Light Grey 0.05
 - "Dark" Red 1.0
- 5.0.3 All other colours should generally plot at 0.18 in the drawn colour.
- 5.0.4 All drawings shall also be provided as A3 PDF files (landscape) in accordance with Contract requirements. Mandatory for all PDF files created utilising AutoCAD DWGtoPDF plot command.

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Appendix 1 - CAD Drawing Checklist

PROJECT NAME:	UNITYWATER PROJECT No.:
	JOB FILE No.:

Tick the box to indicate compliance with UNITYWATER requirements.

<input type="checkbox"/>	Each revision i.e. "Issued for review", "As constructed" etc. is clearly labelled as such in the title block in both revision box and revision description attributed record.
<input type="checkbox"/>	Drawing numbers have been obtained from Unitywater.
<input type="checkbox"/>	Unitywater standard drawing Title block has been used and not modified.
<input type="checkbox"/>	The Unitywater Drawing and Project Name and Number and other relevant information is entered into the Title Block.
<input type="checkbox"/>	All file names comply with the UNITYWATER drawing file naming convention.
<input type="checkbox"/>	All disks have been scanned for virus infections.
<input type="checkbox"/>	All drawings have been saved as AutoCAD format.
<input type="checkbox"/>	All drawings have been test plotted directly from the disks using AutoCAD format.
<input type="checkbox"/>	The current layer in all drawings is set to 0.
<input type="checkbox"/>	All of the Viewports are locked
<input type="checkbox"/>	The drawings are saved in paper space and zoomed extents of title block.
<input type="checkbox"/>	The drawing limits set to "OFF" where relevant.
<input type="checkbox"/>	All site plans and floor plans at 1:100 scale or smaller (1:200, 1:500, etc.) have their spatial coordinates set to match the GDA56 geographical grid system contained in the base site plan(s) supplied by UNITYWATER or, in case of all other drawings, the bottom left hand corner of each drawing is set to 0,0.
<input type="checkbox"/>	Scale bar/s shown as required.
<input type="checkbox"/>	Text styles, linetypes & hatchings and entity colours conform to the UNITYWATER CAD STANDARD.
<input type="checkbox"/>	No special fonts or linetypes are to be used. Only standard fonts those are normally available in typical AutoCAD installations.
<input type="checkbox"/>	All entities are placed on their correct layer, using the UNITYWATER layering standard.
<input type="checkbox"/>	All X-ref drawing files used in the production of drawings have been supplied.
<input type="checkbox"/>	All drawings have been purged of all unused layers, linetypes, blocks, text styles, etc., and all other extraneous and unnecessary information and entities have been erased.
<input type="checkbox"/>	CAD and PDF files supplied on correct media and clearly labelled with files included, date and company or contact name.
<input type="checkbox"/>	The Project Information sheet has been completed in collaboration with UNITYWATER.

Note: Your files may be checked for compliance. Drawing compliance checking/auditing may be conducted using the above checklist and some additional check points.