



Hunter Water Corporation A.B.N. 46 228 513 446

Standard Technical Specification for:

STS 911
**PREPARATION OF CIVIL, STRUCTURAL
AND MECHANICAL ENGINEERING
DRAWINGS**

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Standard Technical Specification Preparation of Civil, Structural and Mechanical Drawings – STS 911

1 Purpose

This Standard Technical Specification details the preparation and submission of all civil, structural and mechanical engineering design drawings to Hunter Water Corporation (Hunter Water).

It does not cover requirements for:

- Work as Constructed (WAC) Drawings specified in *STS 903*
- Electrical Drawings specified in *STS 904*.
- Preparation of Piping and Instrumentation Engineering Drawings (P&IDs) *STS 913*

This Specification is available on the Hunter Water website <http://www.hunterwater.com.au>.

2 Interpretation

For the purposes of the interpretation of *STS 911*, except where the context requires otherwise:

- 'Drawings' means the drawings detailing the work involved in a particular project
- 'Include' means including but not limited to, and is used to provide clarification or examples of the type and nature of items intended
- 'Specification' means a specification detailing the work involved in a particular project
- 'Standards' means applicable industry standards including the Australian Standards (AS), Australian / New Zealand Standards (AS/NZS), and ISO Standards (ISO)
- 'Standard Drawings' means Hunter Water drawings
- 'Standard Technical Specification' (STS) is a reference to any of Hunter Water's Standard Technical Specifications, as implied by the text.

Headings are for the convenience of the reader and shall not be used in the interpretation of this STS.

Unless stated otherwise any expression such as "give notice", "submit", "approval", or "directed" means give notice to, submit to, approval by, or directed by the person nominated by the Hunter Water.

Approval does not imply acceptance of responsibility by Hunter Water for compliance with this STS. Unless approval has been issued in writing by Hunter Water, approval has not been granted.

2.1 Order of Precedence

All work shall meet all stated requirements in this STS in addition to project specifications or standards specified.

Any deviation from this STS shall be approved in writing on a case by case basis by Hunter Water's Document Owner.

3 Roles and Responsibilities

3.1 Document Owner

The Document Owner of *STS 911 – Preparation of Civil, Structural and Mechanical Engineering Drawings* is Hunter Water's Group Manager Information, Control and Energy.

3.2 Responsibilities

The Document Owner shall approve in writing the issue of any updated version of STS 911. Any concession to any requirement in *STS 911 – Preparation of Civil, Structural and Mechanical Engineering Drawings* is valid only when authorised in writing by the Document Owner.

4 Definitions

Where the following term, abbreviation or expression occurs in this STS, it is defined as follows, unless the context implies otherwise.

Term / Abbreviation / Expression	Definition
AS	Australian Standard.
AS/NZS	Australian and New Zealand Standard.
Designer	Person or organisation creating design and drawings for manufacture of equipment or construction of a system of electrical and mechanical equipment.
Hunter Water	Hunter Water Corporation.

5 Compliance Requirements

5.1 Standards

Civil, structural and mechanical drawings shall comply with

- This STS
- Other relevant Hunter Water Standards
- Relevant Australian Standards

Except where otherwise required in this specification, drawings are to comply with the current relevant Standards including, but not limited to those found in Appendix 1.

5.1.1 Hunter Water Standards

Check completed drawings using the standard files HWC Civil_A3.dws or HWC Civil_A1.dws before submission to Hunter Water. Drawings containing errors will not be accepted.

Where the Standards are referenced throughout this STS, they will refer to the number only.

5.2 Copyright

All electronic files supplied by Hunter Water are the property of Hunter Water. This includes, but is not limited to, the contents of the Technical Information Package, including the Microsoft Office format files, AutoCAD format files and associated files, menus, plug-ins, code and scripts (Files). Hunter Water retains all intellectual property and related rights in or relating to the Files including without limitation copyright (including future copyright); confidential information, and all other rights conferred by statute, common law or equity in relation to the Files.

The purpose of the Files is to assist the user in the production of civil, structural and mechanical drawings for Hunter Water in accordance with this Standard Technical Specification and to confirm whether the drawings produced comply with this STS (Intended Use).

The Files are not to be used, copied, modified, manipulated, supplied, reproduced, provided or disclosed by or to any other person or for any purpose other than the Intended Use without the prior written consent of Hunter Water.

To the extent permitted by law, all conditions and warranties concerning the Files expressed or implied by statute, common law, equity, trade, custom or usage or otherwise are expressly excluded. Hunter Water makes no representation as to the stability of the Files and accepts no liability for any loss or damage arising from the instability of the Files.

Hunter Water is not required to provide maintenance support for the Files or detailed instructions on operational use.

The user must ensure that the Files are:

- Used in accordance with any instructions provided by Hunter Water;
- Used appropriately and only for such of the Intended Use; and;
- Only used, accessed, operated, and copied by, or provided to persons who are officers, employees or agents of the user and are aware of and have agreed to be bound by these terms and conditions.

The user acknowledges that a zero error report by the compliance checking files does not guarantee that the drawings checked are compliant with this STS.

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The user indemnifies and will keep indemnified Hunter Water against all actions, suits, claims, demands, costs, charges, damages, liabilities, loss and expenses to which Hunter Water may incur arising out of the provision to the user of, and any use, reproduction or disclosure of or change to, the Files by the user or any other person claiming through the user, which is in any way connected with or arises from the use of the Files.

Drawing files submitted to Hunter Water shall become the copyright property of Hunter Water

6 Drawing Requirements

6.1 Information Provided by Hunter Water

6.1.1 Design Documentation

Prior to commencement of a design, or modification of an existing drawing package, it is the responsibility of the designer to obtain the following information from Hunter Water in Table 1, and ensure the drawing package is the latest revision.

Table 1: Information to be supplied by Hunter Water

Information	Description	Source
Drawing Set Number	Project drawing number	Project Manager
Plant Number	Hunter Water Plant number	Project Manager
Asset Name	Hunter Water Asset name	Project Manager
Index Number	Hunter Water Index number	Project Manager
Drawing setup files		
HWC.ctb	Standard plot style pen table	Civil Drafting Package
HWC_scale.ctb	A1 to A3 plot style pen table	Civil Drafting Package
HWC_B&W.ctb	Standard black and white plot style pen table	Civil Drafting Package
HWC_B&W_scale.ctb	A1 to A3 black and white plot style pen table	Civil Drafting Package
A3 drawings:		
HWC Civil_A3.dws	Drawing standards file	Civil Drafting Package
HWC Civil_A3.dwt	Drawing template	Civil Drafting Package
HWC_A3.lin	Line type file	Civil Drafting Package
A1 drawings:		
HWC Civil_A1.dws	Drawing standards file	Civil Drafting Package
HWC Civil_A1.dwt	Drawing template	Civil Drafting Package
HWC_A1.lin	Line type file	Civil Drafting Package

If required the following information shall be provided by the Hunter Water Project Manager:

- Maintenance hole number
- Maintenance shaft number
- Line number
- Vent number
- Flow relief structure number

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6.2 File format

Supply all drawings in the latest version of AutoCAD or previous two versions in .dwg format. Do not save standard borders drawings and symbols to an earlier AutoCAD version.

6.3 Drawing size

Prepare drawings as A3 or A1 using supplied drawing templates HWC Civil_A3.dwt or HWC Civil_A1.dwt. The template contains layer, line type, text and dimension style definitions, sheet frame and title block.

6.4 Drawing Numbers

The drawing number consists of three segments of information. The segments define a valid drawing number:

- Drawing set number
- Sheet number (3 characters)
- Revision number (2 characters)

The Drawing set, Sheet and Revision number is inserted in the title block.

TITLE: CG375202 SHORTLAND 4 SS-SHO-004-PS1 SECONDARY TREATMENT SLUDGE DISPOSAL RISING MAN					
SIZE: A3	SCALE: NTS	INDEX No. 75800	DRAWING No. 15686	SHEET 001	REV No. 01
S	T	U	V	W	X
				Y	Z

6.4.1 Electronic File Name

The name of the electronic drawing files are to reflect the drawing number

eg

15100 - 001 _ 0A.dwg

Drawing Set Number	Sheet Number	Revision
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or

15100 - 001 _ 01.dwg

Drawing Set Number	Sheet Number	Revision
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6.5 Drawing Specifications

6.5.1 Drawing environment

Supply drawings in AutoCAD model and paper space.

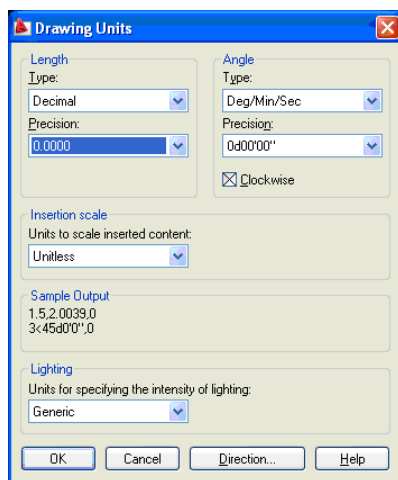
Create all structures in model space with co-ordinates in Map Grid of Australia (MGA2020 Zone 56) and levels in Australian Height Datum (AHD) at a 1:1 scale. Units in metres.

Insert dimensions, labels and annotation text in model space.

Insert the drawing frame, general notes, reference drawing list, material list, pipe work schedule and other notation in "paper space".

Set the AutoCAD system variable "Measurement" to "1". (i.e. Metric)

Set Drawing units to:



Call up Sections and Views alphabetically using capital letters. e.g. Section A. Call up Details numerically e.g. Details 1.

Arrange sections, views and details in sequential order left to right, top to bottom on the drawing sheet.

6.5.1.1 Multiple Sheet Layouts

Multiple sheet layouts in a single .DWG file are accepted. Present PDF copies as a single layout for each file.

6.5.1.2 Scales

AS 1100 scales only shall be used. Scales shall be as adopted from AS 1100 Table 5.1 and 5.2 only on original sized documents.

6.5.1.3 Text styles

All text shall be in accordance with the following:

Table 2: Text Styles - A3 Drawings

Text height	Application	Font	Style	Width Factor	Oblique Angle
1.8mm	Notes and Dimensions	ISOCP	T18	1	0
2.5mm	Labels and Sub Headings	ISOCP	T25	1	0
3.5mm	Main Headings	ISOCP	T35	1	0
5.0mm	Main Headings	ISOCP	T50	1	0

Table 3: Text Styles - A1 Drawings

Text height	Application	Font	Style	Width Factor	Oblique Angle
2.5mm	Notes and Dimensions	ISOCP	T25	1	0
3.5mm	Labels and Sub Headings	ISOCP	T35	1	0
5.0mm	Main Headings	ISOCP	T50	1	0
7.0mm	Main Headings	ISOCP	T70	1	0

Text shall be upper case.

Use lower case lettering for abbreviations for unit of measure. Do not place text directly on line work or symbols. Text must be readable from the bottom or right hand side of the drawing.

6.5.2 Dimensioning

Each dimension shall be a single AutoCAD entity.

6.5.3 Line types

Set the AutoCAD entity's "Linetype" property to "Bylayer".

Set the AutoCAD system variables "Ltscale" and "Psltscale" to "1". Individual elements shall have a constant "Ltscale" of "1".

6.5.4 Layers

Set the drawing entity's colour, line weight and plot pen thickness to:

Table 4: Colour and Line Weights

AutoCAD Entity	Property
Colour	Bylayer
Lineweight	Bylayer
Plot Style	Bycolor

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6.5.4.1 Layering structure

Use layers supplied in the template files *HWC Civil_A3.dwt* or *HWC Civil_A1.dwt*. Freeze layers not required in the drawing.

Drawings with non-standard layers will not be accepted unless previously agreed in writing from: plan_room@hunterwater.com.au.

6.5.5 Title block

Complete all title block text attribute fields. If there is no information available for a specific field leave the field blank. E.g. Plant number

Do not place company logos on the drawing. The company's abbreviated name shall be detailed in the allocated area on the standard border. Insert consultant's project reference number in appropriate field.

6.5.6 External References

Drawings containing external references shall not be accepted. Convert all external references to AutoCAD inserted "Blocks" prior to submission. Binding the reference file and layers containing external reference file names shall not be accepted.

All external reference files inserted as blocks shall be inserted on layer "0" (zero). External reference files must not contain additional layers to those provided in the Hunter Water template.

6.5.7 Plotting Drawing Information

The file path, name and last plotted information are inserted as an RTEXT element. This shall not be removed.

Plotted drawings shall:

- Be Colour dependant plot style using pen style table *HWC_B&W.ctb* Have Default plotter set as "default windows system printer".

6.5.8 Hatching and Shading

Use hatching or shading to clarify or enhance the drawing content. It shall be "bylayer" for colour, line type and weight and be consistent throughout the drawing set. Place hatching on appropriate hatching layers.

6.5.9 Symbols, Blocks and Abbreviations

Use symbols where appropriate. List and define symbols on a Symbols and Abbreviations drawing towards the front of drawing set.

Use abbreviations where appropriate. List and define abbreviations on the Abbreviations and Symbols drawing.

6.5.10 Signatories

The following drawing review and approval information is required on the title block.

Table 5: Approvals

Signatory	Information to be included
Designed	The name of the designer certifying that the design requirements for the project (including technical standards) have been met. Abbreviate the name by using the designer's three initials. The date on which the designer has certified the above. The abbreviated name of the company for which the designer is employed.
Drawn	The name of the draftsperson who prepared the drawing. Abbreviate the name by using the draftsperson's three initials. The date for which the draftsperson has completed the above. The abbreviated name of the company for which the draftsperson is employed.
Checked	The name of the appropriate design team leader verifying that an independent examination of the engineering design and drawing has been carried out to confirm compliance with design standards, accuracy of content and conformance with accepted good practice. Abbreviate the name by using the design team leader's three initials. The design team leader is typically not the same person who has completed the design / drafting. The date for which the design team leader has completed the above. The abbreviated name of the company for which the design team leader is employed.
Approved	The name of the delegated officer confirming that the drawing meets the requirements of the project and that the drawing can be issued for use. The person approving the drawing is typically not the same person who has checked / designed or has completed the drawing. The date for which the delegated officer has verified the above. The abbreviated name of the company for which the delegated officer is employed.
Date Drawn	Dates are to be shown with a 'forward slash' separation and with two digits for day, month and year; e.g. 01/01/11 1.1.11, 1/1/11, 01-01-11 and 01/01/2011 format are not acceptable.

6.5.11 Other

6.5.11.1 Images

Keep the use of images to a minimum. Place images on the defined layer and set "imageframe" system variable to "2". The inserted image shall have a box with diagonal line placed around it on the "defpoints" layer to indicate extents. Text shall be placed along the line to identify the image file name.

Image file names shall comply with the following:

- Drawing set number
- 3 letter image identifier prefix (IMG)
- Image descriptor (eg. locality map)

eg. 14919-IMG-locality_map.jpg.

The following files are accepted:

Table 6: Accepted File Types

Extension	Description
*.ecw	ECW Compressed Image Format
*.gif	Graphics Interchange Format
*.jpg	JPEG File Interchange Format
*.jpeg	JPEG File Interchange Format
*.jp2	JPEG 2000
*.j2k	JPEG 2000
*.tif	Tagged Image File Format
*.tiff	Tagged Image File Format
*.bmp	Windows Bitmap

Insert image files using relative paths to avoid loss of data when submitted. Locate all files in the same directory as the drawing they are inserted in. Transmit all image files with the drawings when drawing files are submitted.

6.6 Drawing Modifications

6.6.1 Revisions

Drawings supplied during review stages of a design shall be given a sequential letter. eg. Revision A - 1st Draft, Revision B - 2nd Draft or Revision C - Client Review etc.

Once a drawing has been approved for Construction it shall be given a revision status of 0 (zero). eg. Revision 0 - Construction Issue.

When an amendment is made to the drawing following construction issue, the drawings shall display the next sequential number in the title block such as a '1', '2' or '3',

eg. Revision 1 - Dimension Updated or Revision 2 - Work-As-Constructed.

The revision box of the drawing shall be updated with the revision number and description of the amendment before the drawing is re-issued.

6.6.2 Highlighting revisions

Amendment triangle/s containing the revision number shall be placed adjacent to the modified section when changes to the final design drawing have been made. Revision cloud/s shall also be used to highlight modifications.

6.6.3 Work as Constructed

Revise the electronic versions of all Construction Drawings to accurately depict the Work As Constructed. "Construction Drawings" refers to all drawings issued or prepared to define the physical characteristics of the works to be constructed.

Comply with all the requirements of this STS when preparing and submitting Work As Constructed drawings.

Check and revise as necessary all dimensions, co-ordinates, levels, materials and other drawing notations.

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For any features which are noted on the Construction Drawings to be located, sized or otherwise determined during construction amend the notation to indicate the actual location, size or characteristic.

Remove all pre-construction notes when submitting Work as Constructed drawings.

Revision symbols and clouds shall be in “paper space” and removed or placed on a frozen layer when drawings are revised as Work as Constructed.

6.7 Supply of Drawings

Supply final design drawings and any subsequent amendments in DWG and individual PDF files.

Supply populated spread sheet (Drawing register.xls) provided in the HWC Civil_3 zip file.

The following checklist shall be completed before drawings are submitted:

Table 7: Drawing Completion Checklist

1	Entities in “Model” space which are not part of the final design removed
2	All irrelevant blocks, layers, text styles purged
3	Drawings checked using relevant DWS file
4	Drawings checked for errors using the AutoCAD “Audit” command and any encryption or passwords removed
5	UCS set to “world”
6	Model view set to “plan”
7	Ltscale set to 1
8	PSLtscale set to 1
9	Drawings plotted using relevant CTB file
10	Default plotter set as “default windows system printer”
11	Saved in “zoom extents” format in paper space
12	Viewport layer frozen off for display
13	Viewports locked for display

7 Related Documents

Other Hunter Water drawing standards include:

- STS 904 – Standard Technical Specification – Preparation of Electrical Drawings
- STS 903 – Standard Technical Specification – Preparation of Work as Constructed Drawings
- STS 913 – Standard Technical Specification – Preparation of Piping and Instrumentation Drawings (P&ID)

8 Document control

Document Owner: Group Manager Information, Control and Energy

Document Approver: Group Manager Information, Control and Energy

Version	Date	Author	Details of change	Approval Date	Approved by	Next Scheduled Review
2.0	Dec 2013	J. Yearsley	Full revision Update to new format Add 'Mechanical' to title	Feb 14	G Baker	Jan 16
2.1	Oct 2015	J. Yearsley	Minor revision	July 2015	S Horvath	July 2017
2.2	July 2016	J. Yearsley	Minor revision	July 2016	S Horvath	July 2018
3.0	March 2018	JY, SG	P&ID details added	March 2018	S Horvath	March 2020
4	Feb 2022	T.Hartigan T.Thompson J.Yearsley	Minor revision and PID details removed	22/02/2022	R.MacNeil	Feb 2024

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Appendix A: Australian Standards

For clarity, where a standard has several parts and/or amendments and/or supplements, the reference number is for the leading part of the standard. The standards listed below are deemed relevant to lifting equipment. This is not an exhaustive list.

Name	Number
AS ISO 1000-1998	The international system of units (SI) and its application
AS 1100.101-1992	Technical drawing - General principles
AS 1100.201-1992	Part 201: Mechanical engineering drawing
AS 1100.401-1984 / Amdt 1-1984	Technical drawing - Engineering survey and engineering survey design drawing
AS/NZS 1100.501:2002	Technical drawing - Structural engineering drawing
AS 1101.1-2007	Graphic symbols for general engineering - Hydraulic and pneumatic systems
AS 60417.1-2004	Graphical symbols for use on equipment - Overview and application
HB7-1993	Engineering drawing handbook