



University of Wollongong

Documentation Standards
V4 –16 September 2011



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12.1 OVERVIEW

Documentation includes all drawings, manuals and other documents prepared for and submitted to the University of Wollongong (UOW). UOW require documentation to be prepared and submitted for capital works, minor works and services.

Compliance with this documentation standard ensures that hard copy and electronic data received by UOW is consistent and compatible with UOW's existing documentation.

12.2 RESPONSIBILITY

The designer, in conjunction with the UOW Project Officer, is responsible for compliance with this standard, and shall coordinate all design consultants and building contractors who are responsible for the specification and preparation of 'Construction Issue' drawings, 'As Built' drawings and Operation & Maintenance Manuals.

Where work is undertaken directly to UOW, the responsibility resides with the relevant design consultant and/or building contractor.

12.3 DOCUMENT SUBMISSION PROCESS

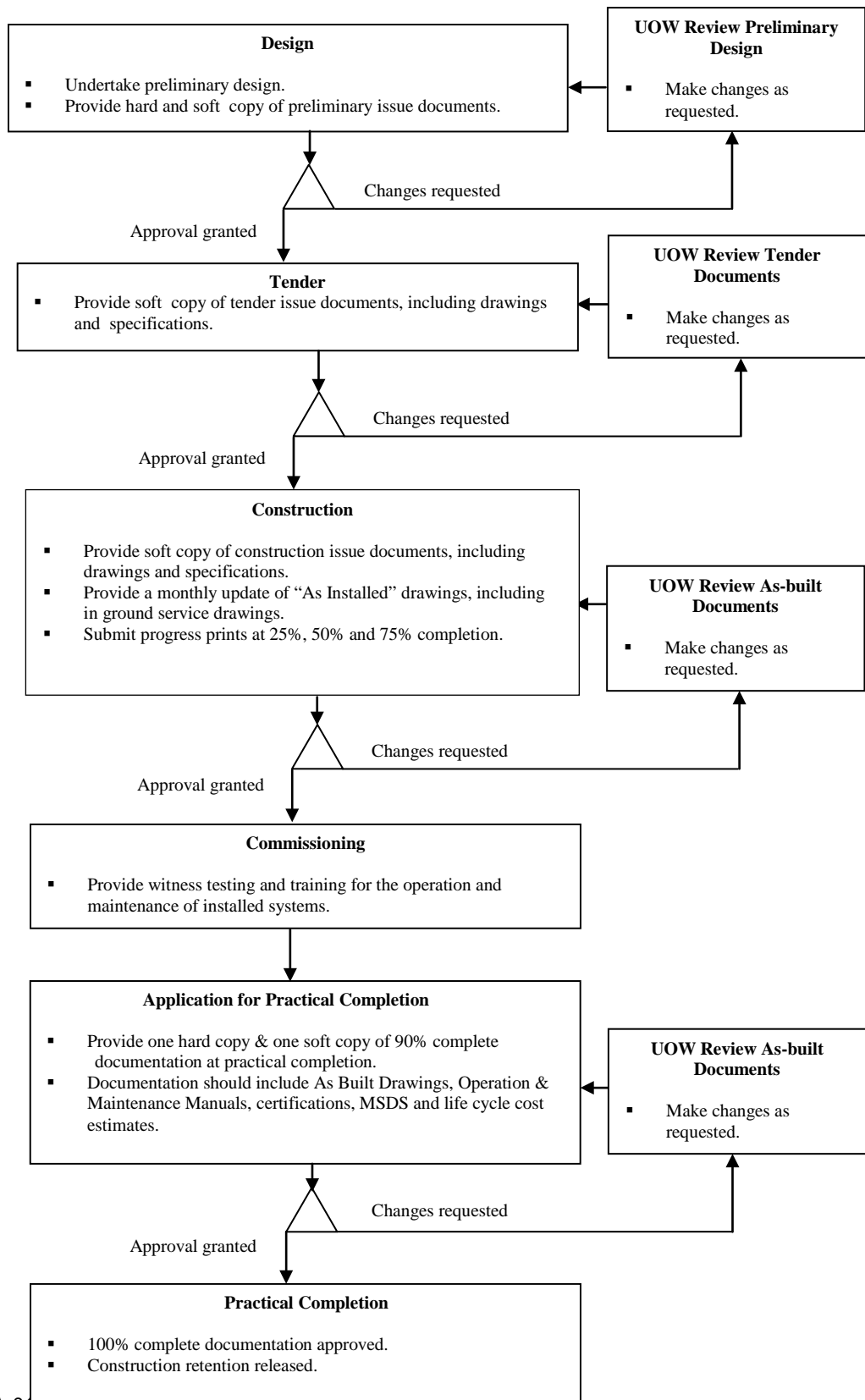
Contract documentation must comply with the following submission requirements:

- One (1) complete soft copy of "Tender" documentation must be submitted.
- One (1) complete soft copy of "Construction" documentation must be submitted.
- "As Installed" drawings, including In-ground Service drawings, must be progressively marked up and reviewed at site meetings on a monthly basis during the construction stage. Progress prints must be submitted at 25%, 50% and 75% complete stages.
- One (1) hardcopy and one (1) soft copy of 90% complete documentation (which includes manual and drawings) must be submitted for approval at application for Practical Completion. Refer to Section 12.4 & 12.5 for details of document submission requirements
- One (1) complete soft copy of final documentation must be submitted 4 weeks after Practical Completion.
- Construction retention will not be returned until final approved as-built drawings and operation & maintenance manuals have been issued.



If, during Defects Liability Period, any subsequent information is to be included in the manuals, it shall be provided in one (1) hard copy and one (1) soft copy and in a complete section for ease of integration into the O&M Manual.

Figure 1 below shows the document submission process:





12.4 DRAWINGS

12.4.1 General

All design drawings prepared for UOW shall comply with the following standards:

- a. A1 sheets shall be used for all plans, construction layouts, and single line diagrams. Drawings shall be legible when printed out at A3.
- b. A3 sheets shall be used for detail drawings and rendered illustrations.
- c. Drawing size shall be clearly noted in the title block.
- d. All drawings shall include a title block with version, issue, date, drawn by, project title, softcopy filename and the UOW logo.
- e. All plan drawings shall clearly show the north point.
- f. All drawings shall be clearly identified as “Preliminary”, “Tender”, “Construction” or “As Installed”.
- g. All drawings shall have a scale bar.
- h. Soft copies of drawings shall be provided in both AutoCAD (dwg) and Adobe Acrobat (pdf) formats.
- i. All AutoCAD cross reference drawings shall be bound into original drawing..
- j. Unused objects, line types and entities shall be purged to keep drawing file size to a minimum.
- k. All soft copy drawings submitted shall be able to be viewed and edited in the two latest versions of AutoCAD.
- l. Arial Narrow or Arial shall be used as the standard font for all text included on drawings.
- m. All drawings shall use the ‘Bylayer’ method, which ensures only one line type and colour per layer;
- n. Only AutoCAD standard line types (as defined in acad.lin) shall be used.
- o. Alternate line types and fonts may only be used with the permission of the project manager. A copy of the fonts and line types must be included with drawing file when issued.
- p. UOW's standard colours are identified in Table 1 following. If non-standard colours are used, the plot style table (ctb file) must be included with the drawing file.



Screen Colour	Plot Colour	Plot width
Red – Colour 1	Black	0.45mm
Yellow – Colour 2	Black	0.3 mm
Green – Colour 3	Black	0.9 mm
Cyan – Colour 4	Black	0.65 mm
Blue – Colour 5	Black	0.2 mm
Magenta – Colour 6	Black	0.2 mm
White – Colour 7	Black	0.2 mm
Grey – Colour 8	Black	0.1 mm
Grey – Colour 9	Black	0.1 mm
Colour 31	Red	0.1 mm
Colour 32	Red	0.6 mm
Colour 33	Red	0.3 mm
Colour 51	Yellow	0.1 mm
Colour 52	Yellow	0.6 mm
Colour 53	Yellow	0.3 mm
Colour 71	Green	0.1 mm
Colour 72	Green	0.6 mm
Colour 73	Green	0.3 mm
Colour 131	Cyan	0.1 mm
Colour 132	Cyan	0.6 mm
Colour 133	Cyan	0.3 mm
Colour 151	Blue	0.1 mm
Colour 152	Blue	0.6 mm
Colour 153	Blue	0.3 mm
Colour 201	Magenta	0.1 mm
Colour 202	Magenta	0.6 mm
Colour 203	Magenta	0.3 mm
Colour 250	Black	0.05 mm
Colour 251	Grey	0.1 mm
Colour 252	Grey	0.6 mm
Colour 253	Grey	0.3 mm

Table 1 - UOW Standard Colours



12.4.2 Room Numbers

Prior to tender submission all room numbers are to be confirmed and approved by Buildings and Grounds.

12.4.3 Survey Drawings

Survey drawings shall comply with the following format:

- a. All survey drawings shall be based on the 'Map Grid of Australia'.
- b. All contour lines shall be minimum 0.5 metre.
- c. Survey to include corners of buildings within survey vicinity.
- d. State Control Points for Main Campus are located in Northfields Avenue:
 - PM 4442 – RL 47.531 – E 1019.68 – N 933.45
 - PM 16948 – RL 24.114 – E 1696.78 – N 970.80Internal control point locations and coordinates may be obtained from Buildings and Grounds.
- e. Control Points for Innovation Campus are located in Squires way:
 - PM
 - PM
- f. Dwg file to include (in model space) two relevant control points.
- g. Certified survey of Ground Floor Slab to be submitted to the following tolerances
 - Slab edge (on plan) +/- 25mm
 - Slab Level +/- 10mm.
- h. The date shall be clearly indicated.
- i. North point shall be clearly indicated.



12.5 OPERATION AND MAINTENANCE MANUALS

12.5.1 General

Operation and maintenance manuals shall be submitted for all services installations and building elements with specific maintenance requirements. The operation and maintenance manuals shall contain separate sections on correct operating procedures, specific maintenance tasks and detailed technical information.

Operation and maintenance manuals shall be formatted as follows:

Soft Copy

Each manual shall be provided on a separate disk.

Each disk shall be labelled with the typed or printed title 'OPERATION AND MAINTENANCE MANUAL' in capital lettering on the disk and the cover.

Each manual shall be one file only in contents order.

Manual to be provided as pdf , and word format where possible. Drawings in manual to be provided as pdf and dwg files.

Wherever possible the pdf file is to be created from an original electronic document.

Each disk shall be version controlled and identified with the title of the project, volume number, volume subject matter, revision and date of issue.

A table of contents shall be provided for each volume.

The pages shall be consecutively numbered.

All operation and maintenance manuals shall contain:

- a. A general description of the installed system,
- b. A directory listing of names, addresses and telephone and facsimile numbers of the designer, sub-consultants, contractors, sub-contractors and names of responsible parties,
- c. A directory listing the name, address, telephone and facsimile numbers and web links of the manufacturer and supplier of items of equipment installed, together with catalogue list numbers.



- d. An approved listing of Agreed Departures from the current UOW Design Standards at the time (note version of current UOW Design Standards).
- e. Photographic identification of in-ground services to clarify relevant location.

12.5.2 Technical Specifications, Certification & Warranties

Detailed technical specifications shall be provided on each piece of equipment. The manufacturer or a suitably qualified consultant may provide technical information. Technical specifications should contain the following information:

- a. A technical description of the system installed, written to ensure that UOW's staff fully understand the scope and facilities provided.
- b. The system's function, normal operating characteristics, and limiting conditions.
- c. A technical description of the mode of operation of the system(s) installed and final setup that meets design performance.
- d. Schedules (system by system) of equipment, stating locations, duties, performance figures and dates of manufacture.
- e. A unique code number for each item of equipment installed, cross-referenced to the diagrammatic drawings and schedules, including spare parts schedule.
- f. Manufacturers' technical literature for equipment installed, assembled specifically for the project, excluding irrelevant matter. Product data sheets shall clearly identify specific products and component parts used in the installation, and data applicable to the installation.
- g. Supplements to product data shall illustrate relations of component parts.

Certification shall be provided to ensure all systems and equipment complies with the relevant standards and OH&S regulations. The following certificates shall be provided as part of the operation and maintenance manuals for each system installed:

- a. Certificates and Registrations from authorities.
- b. Product certification.
- c. Copies of commissioning results for the installation and equipment used in the installation (Refer to the relevant UOW Commissioning Standard).



- d. Commissioning Test reports.
- e. Material Safety Data Sheets (MSDS).

Copies of manufacturers' warranties shall be provided as part of the operation and maintenance manuals for all systems.

12.5.3 Operation Manuals

The following information shall be provided to ensure correct operating procedures for each system installed and commissioned:

- a. Safe starting up, running-in, operating and shutting down procedures. Include logical step-by-step sequence of instructions for each procedure.
- b. Control sequence and flow diagrams.
- c. Legend for colour-coded services.
- d. Schedules of fixed and variable equipment settings established during commissioning and maintenance.
- e. Procedures for seasonal changes.
- f. Drawings and technical data as necessary for the efficient operation of the installed system.

12.5.4 Maintenance Manuals

The following information shall be provided to ensure that maintenance tasks are performed correctly and systems run efficiently:

- a. Detailed recommendations for preventative maintenance frequency and procedures.
- b. Safe trouble-shooting, disassembly, repair and reassembly, cleaning, alignment and adjustment, balancing and checking procedures. Provide logical step-by-step sequence of instructions for each procedure.
- c. Schedule of spare parts and recommendation of items to be held on site, being those items subject to wear or deterioration and which may involve extended delivery times when replacements are required. Include complete nomenclature and model numbers, and local sources of supply.



- d. Schedule of normal consumable items, local sources of supply, and expected replacement intervals up to a running time of 40,000 hours. Include lubricant and lubrication schedules for equipment.
- e. Instructions for use of specialised tools and testing equipment.
- f. Emergency procedures, including telephone numbers for emergency services, and procedures for fault finding.
- g. Risk assessment of plant & equipment with control measures detailed.

12.5.5 Witness Testing and Training

As a requirement of practical completion conduct witness testing with client and consultant. Demonstrate critical code and safety requirements of the plant and equipment. As-built drawings shall be used to demonstrate this process.

As a requirement of practical completion and prior to occupation, explain and demonstrate to UOW staff as nominated by the project manager the purpose, function and operation of the installations. Use items and procedures listed in the final draft operation and maintenance manuals as the basis for instruction. Conduct the witness testing and training at an agreed time, at system or equipment location.

Immediately following practical completion, explain and demonstrate to the UOW Maintenance Manager or nominee the purpose, function and maintenance of the installations. Use items and procedures listed in the final version operation and maintenance manuals as the basis for instruction.

Refer to appropriate UOW Commissioning Standards.



12.6 AS-BUILT DOCUMENTATION

As-built documentation shall consist of the following parts as a minimum requirement:

- Operation Manual.
- Maintenance Manual.
- Authority approval drawings.
- Construction drawings.
- As-built drawings incorporating final room numbers.

As-built drawings shall include the following features:

- a. Dimensions, types and location of equipment, cables, piping and ductwork in relation to permanent site features and other underground services.
- b. As-installed locations of building elements, plant and equipment.
- c. Off-the-grid dimensions (where applicable).
- d. Relationship to building structure and other services, and changes made during commissioning and the maintenance period.
- e. Diagrammatic drawings of each system showing piping and wiring, and principal items of equipment.

In addition to the standard information described above, the following information shall be provided for each of the services listed:

12.6.1 Hydraulic Services

The following hydraulic services documentation shall be provided for all projects:

- Trade based specification.
- Sketch plans.

Each set of hydraulic services drawings shall include the following:

- Site plan and reticulation (scale not smaller than 1:1000).



- Major pipe runs indicating control valves, meters, access pits and connections to existing services.
- Reticulation indicating materials, pipe sizes, control valves, fixtures and taps.
- Diagrammatic presentation of hydraulic services in axonometric or two dimensional forms.
- Construction details of pits, inspection openings, valves, etc.
- Schedules of fixtures and fittings with brand names, models etc.

The following minimum information shall be provided on all hydraulic services drawings:

- Pipe inverts and associated ground levels, at junctions, pipe crossovers and at termination of runs.
- Pipe gradients.
- Pits, trade waste arresters and capacities.
- Fittings, fixtures and appliances.
- Connection to, and location of all authorities mains and existing internal services, including sizes, invert levels and associated ground levels.
- Symbolised fixtures, appliances and stacks at each building, including loadings on site plans.
- Dimensioned locations of all pits, tanks, etc.
- All contour levels.
- All downpipe locations.
- Dimensioned service locations (site plan).
- Boundaries and roads.

The following minimum information shall be provided as the Table of Contents for the Hydraulic Operation & Maintenance Manual:

- Sewer Drainage.
- Water Services:
 - Potable.
 - Non Potable.



- Fire Services.
- Gas Services:
 - Gas Suppression Systems.
- Recycled Water System.
- Schedules of Equipment-Fixtures and Tapware.
- Schedule of Manufacturers and Sub-Contractors.
- Manufacturers Data.
- Warranties/Test Results/Certification.
- Agreed Schedule of Departures from the current UOW Design Standards.

12.6.2 Mechanical Services

Each set of mechanical services documentation shall include the following information as a minimum for all projects:

- Duct sizes.
- Damper locations, size and type.
- Field equipment locations.
- Software algorithms for all control loops.
- Pipe routes and sizes.
- Air balancing results.
- Sound level tests.
- Commissioning results.
- Isolator locations.

The following minimum information shall be provided as the Table of Contents for the Mechanical Operation & Maintenance Manual:

- Description of the Mechanical Systems.
- Description of the Building Management Systems.
- Normal Operating Procedure meeting designed performance.
- Emergency Operating Procedure:



- Design Fire Mode of Operation.
 - Description of Automatic Controls.
 - Manufacturers Recommended Routine Maintenance.
 - Maintenance Schedule.
 - Schedules of Equipment.
 - Schedule of Manufacturers and Sub-Contractors.
 - Manufacturers Data.
 - Warranties/Test Results/Certification.
 - Agreed Schedule of Departures from the current UOW Design Standards.

12.6.3 Electrical Services

Each set of electrical services documentation shall include the following information as a minimum for all power and lighting projects:

- As-built drawings incorporating final room numbers.
- Field equipment locations such as pits, conduit locations and sizes.
- Electrical distribution board locations.
- Schematic of power and lighting reticulation.
- Distribution board schedules incorporating final room numbers.

Each set of electrical services documentation shall include the following information as a minimum for all emergency and exit sign projects:

- As-built drawings indicating equipment locations and numbers and final room numbers.
- Addressable commissioning results.
- Project specific schematic of reticulation.
- Location of main test point.

The following minimum information shall be provided as the Table of Contents for the Electrical Operation & Maintenance Manual:

- Project Details.



- Switchboards, PFC and Distribution Boards.
- Lighting & Lighting Controls.
- General Purpose Outlets and Accessories.
- Power Generation.
- Fire Detection System (Refer 12.6.4).
- Communications.
- Security and Access Control System & CCTV (Refer 12.6.6 & 12.6.7).
- General Electrical Accessories.
- Metering System.
- Schedule of Manufacturers & Sub-Contractors.
- Manufacturers Data.
- Warranties/Test Results/Certification.
- Agreed Schedule of Departures from the current UOW Design Standards.

12.6.4 Fire Services

Each set of fire services documentation shall include the following information as a minimum for all projects:

- As-built drawings incorporating final room numbers.
- FIP location.
- Detector, breakglass alarm and other field device locations on floorplans incorporating item number.
- Programming matrix of FIP.
- Softcopy of FIP programme.
- Block plans showing zones and final room numbers.
- 100% addressable detector results.
- Commissioning test results of fire trips, e.g. air conditioning, gas, autodoor, access control, isolates.
- EWIS sound level test results.



12.6.5 Architectural

Each set of architectural documentation shall include the following information as a minimum for all projects:

- Soft copy of as-built architectural drawings.
- Locations of fire walls and fire doors.
- Final room numbers.

12.6.6 Electronic Monitoring and Access Control (EMAC)

Each set of EMAC documentation shall include the following information as a minimum for all projects:

- Field processing unit locations.
- Field device descriptions, types and locations.
- Hub and switch locations.
- Cable paths.
- Location of operator's terminal.
- Printout of points list.
- Commissioning test results.

12.6.7 Closed-Circuit Television (CCTV)

Each set of CCTV documentation shall include the following information as a minimum for all projects:

- Camera types, locations and field of view.
- Field processing unit locations.
- Hub and switch locations.
- Cable paths.
- Location of operator's terminal.
- Printout of points list.
- Commissioning test results.