



Charles Sturt
University

Revision 1.0

Infrastructure Design Standards

Module S23: Commissioning, Handover and Training

Division of Finance (Strategic Infrastructure)
Charles Sturt University

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1. Introduction

1.1. Overview

The Charles Sturt University Infrastructure Design Standards (the Standards) outline the University's expectations for its built forms to achieve consistency in the quality of the design and construction of those built forms.

The Standards have been developed to provide guidance to the design team and to assist Facilities Management to drive a consistent approach to the design, construction, commissioning, handover, and operation of new capital projects to ensure the new asset is fully integrated into campus life and conforms to the University's standards and policies.

The successful integration of any new project into the day-to-day operation of campus life cannot be underestimated and is vital to ensuring the new asset provides a fully functional platform for Facilities Management clients and the University. The Standards will ensure Facilities Management is successful in supporting the University's strategic objectives now and into the future. The pitfall of viewing any new project as a standalone entity must be avoided as any new project is an extension of the existing campus.

The Standards are aligned with Charles Sturt's requisites for aesthetic appeal, life cycle maintenance and environmental sustainability, while ensuring that there is sufficient scope for innovation and technological advancements to be explored within each project.

1.2. The University

The history of Charles Sturt University dates to 1895, with the establishment of the Bathurst Experiment Farm. Formed progressively through the merge of regional institutions in south-western and western NSW, Charles Sturt was formally incorporated on 19 July 1989 under the Charles Sturt University Act 1989. As one of Australia's newer universities, Charles Sturt has been built on a tradition of excellence in teaching and research spanning more than 100 years.

With over 40,000 current students studying both on-campus and online, Charles Sturt University is the largest tertiary education institution in regional Australia. The University operates six main campuses across New South Wales in Albury-Wodonga, Bathurst, Dubbo, Orange, Port Macquarie, and Wagga Wagga, alongside specialist campuses in Canberra, Parramatta, and Goulburn. Charles Sturt University is structured around three Faculties: Arts and Education; Business, Justice and Behavioural Sciences; and Science and Health.

1.3. University Vision and Values

Charles Sturt University is committed to building skills and knowledge in its regions by offering choice and flexibility to students, while collaborating closely with industries and communities in teaching, research, and engagement. As a significant regional export industry, the University brings both strength and learning back to

its regions, positioning itself as a market-oriented institution. Its goals are to remain the dominant provider of higher education in its regions and a sector leader in flexible learning.

Charles Sturt University believes that wisdom has the power to transform communities. With perseverance and dedication, the University contributes to shaping resilient and sustainable regions for the future. Acknowledging the deep culture and insight of First Nations Australians, the University's ethos is encapsulated by the Wiradjuri phrase *yindyamarra winhanganha*, which translates to "the wisdom of respectfully knowing how to live well in a world worth living in." Through its values, Charles Sturt University fosters a welcoming community and learning environment that supports innovation, drives societal advancement, and gives back to the regions it serves.

1.4. Using the Infrastructure Design Standards

The Infrastructure Design Standards are written to advise Charles Sturt University performance requirements and expectations that exist above and beyond existing industry codes and standards.

The Infrastructure Design Standards do not repeat codes and standards.

Performance to Codes and Standards are a non-negotiable regulatory minimum of any design solution, to be determined for each project by the design team.

The Standards are to be used by all parties who are engaged in the planning, design, and construction of Charles Sturt's facilities. This includes external consultants and contractors, Charles Sturt's planners, designers, and project managers as well as faculty and office staff who may be involved in the planning, design, maintenance, or refurbishment of facilities. All projects must comply with all relevant Australian Standards, NCC, EEO as well as Local Government and Crown Land Legislation.

1.5. Modules

The Standards are divided into the following modules for ease of use, but must be considered in its entirety, regardless of specific discipline or responsibilities:

- S01 Overview and Universal Requirements
- S02 Active Transport
- S03 Acoustics
- S04 Building Management System
- S05 Electrical and Lighting
- S06 Energy Management
- S07 Ergonomics
- S08 Fire and Safety Systems
- S09 Floor and Window Coverings
- S10 Furniture
- S11 Heritage and Culture
- S12 Hydraulic

- S13 Information Technology
- S14 Irrigation
- S15 Mechanical Services
- S16 Roof Access
- S17 Termite Protection, Vermin Proofing and Pest Management
- S18 Security Systems
- S19 Signage
- S20 Sustainable Building Guidelines
- S21 Waste Management
- S22 Project Digital Asset and Data Requirements
- **S23 Commissioning, Handover and Training**

1.6. Related Documents

1.6.1. University Documents

The Standards are to be read in conjunction with the following relevant University documents, including but not limited to:

- Facilities and Premises Policy along with supporting procedures and guidelines
- Charles Sturt University Accessibility Action Plan 2020 - 2023
- Relevant operational and maintenance manuals
- Charles Sturt University Asbestos Management Plan
- Charles Sturt University Signage Guidelines
- Charles Sturt University Modern Slavery Statement
- Charles Sturt University Sustainability Statement
- Charles Sturt University Work Health and Safety Policy
- Charles Sturt University Risk Management Policy
- Charles Sturt University Resilience Policy
- Charles Sturt University Health, Safety and Wellbeing Policy

1.6.2. Federal Legislation

The planning, design and construction of each Charles Sturt University facility must fully comply with current relevant Federal legislation, including but not limited to:

- National Construction Code (NCC)
- Disability Discrimination Act 1992 (DDA)
- Environment Protection and Biodiversity Conservation Act 1999 (EPBC)
- Work Health and Safety Act 2011

1.6.3. NSW State Legislation

The planning, design and construction of each Charles Sturt University facility must fully comply with current relevant Federal legislation, including but not limited to:

- Work Health and Safety Act 2011
- Environmental Planning and Assessment Act 1979 (EP&A Act)
- Building and Development Certifiers Act 2018
- Heritage Act 1977
- Protection of the Environment Operations Act 1997 (POEO Act)
- Design and Building Practitioners Act 2020
- State Environmental Planning Policies (SEPPs)
- Local Government Act 1993

1.6.4. Federal Regulations and Standards

- Relevant Australian or Australian/New Zealand Standards (AS/NZS)
- Safe Work Australia Model Codes of Practice
- Work Health and Safety Regulations 2011
- Disability (Access to Premises – Buildings) Standards 2010
- National Environment Protection Measures (NEPMs)

1.6.5. NSW State Regulations and Standards

- SafeWork NSW Codes of Practice
- Disability (Access to Premises – Buildings) Standards 2010
- Building and Development Certifiers Regulation 2020
- NSW Work Health and Safety Regulation 2017
- Protection of the Environment Operations (General) Regulation 2022
- NSW State Environmental Planning Policies (SEPPs)
- Fire and Rescue NSW Fire Safety Guidelines
- NSW Local Council Development Control Plans (DCPs)

1.6.6. Manufacturer Specifications and Data Sheets

All installation must be carried out in accordance with manufacturer specifications and data sheets to ensure product performance over its intended life and so as not to invalidate any warranties.

1.6.7. Project-Specific Documents

Requirements specific to a particular project, campus, or other variable, will be covered by project specific documentation, such as client briefs, specifications, and drawings. These Standards will supplement any such

project specific documentation. The Standards do not take precedence over any contract document, although they will typically be cross-referenced in such documentation.

Extracts from the Standards may be incorporated in specifications; however, it must remain the consultant's and contractor's responsibility to fully investigate the needs of the University and produce designs and documents that are entirely 'fit for purpose' and which meet the 'intent' of the project brief.

1.7. Discrepancies

The Standards outline the University's generic requirements above and beyond the above-mentioned legislation. Where the Standards outline a higher standard than within the relevant legislation, the Standards will take precedence. If any discrepancies are found between any relevant legislation, the Standards and project specific documentation, these discrepancies should be highlighted in writing to the Manager, Capital Works.

1.8. Departures

The intent of the Standards is to achieve consistency in the quality of the design and construction of the University's built forms. However, consultants and contractors are expected to propose 'best practice / state of the art' construction techniques, and introduce technological changes that support pragmatic, innovative design. In recognition of this, any departures from relevant legislation, or the Standards, if allowed, must be confirmed in writing by the Manager, Capital Works. Any departures made without such written confirmation shall be rectified at no cost to the University.

1.9. Professional Services

All projects at Charles Sturt University require the involvement of adequately skilled and experienced professionals to interpret and implement the Standards. Consultants or contractors lacking proper qualifications and licenses are not permitted to conduct any work.

1.10. Structure of Document

This document is structured into 4 sections:

Section 1 Introduction (this Section).

Section 2 General Requirements – outlines the general requirements or design philosophies adopted at Charles Sturt University.

Section 3 Supporting Documentation – Legislation, Standards, Codes of Practice, University Policies, and other applicable technical references.

Section 4 Specifications (if applicable) – materials specifications and/or preferred lists for materials, processes or equipment used by Charles Sturt University.

2. General Requirements

2.1. Commissioning

Commissioning is a critical phase in ensuring the successful implementation and operation of building systems. This section outlines key steps and requirements for effective commissioning.

2.1.1. Reports

Submit comprehensive reports documenting observations and results of tests conducted during the commissioning process. These reports should clearly indicate compliance or non-compliance with specified requirements, standards, and regulations. Detailed findings and recommendations should be included to facilitate informed decision-making and corrective action where necessary.

2.1.2. Notice

Provide adequate notice for the inspection of the commissioning of installations to relevant stakeholders, including building owners, facility managers, and regulatory authorities. This ensures that all parties involved have sufficient time to prepare for and participate in the inspection process. Clear communication and coordination of schedules are essential to facilitate a smooth and efficient inspection process.

2.1.3. Starting Up

The startup process for various systems and equipment demands careful planning and execution to ensure smooth functionality and minimize potential risks. This section outlines important protocols and procedures to be followed during the startup phase, stressing the need for coordinated scheduling, thorough checks, and adherence to manufacturers' guidelines. By diligently following these procedures, the goal is to ensure proper installation and optimal performance of equipment, ultimately leading to the submission of a detailed report confirming functionality. Key protocols:

General Coordination: Coordinate startup schedules for various systems and equipment, providing at least 5 working days' notice before initiating each item.

Pre-Startup Checks: Prior to startup, verify that each piece of equipment undergoes thorough checks for proper lubrication, drive rotation, belt tension, control sequence, circuit protection, and any other conditions that may cause damage.

Testing and Verification: Confirm that tests, meter readings, and specified electrical characteristics align with the requirements stipulated by the manufacturer.

Wiring and Component Verification: Ensure that wiring and support components for equipment are fully installed, tested, and compliant with specifications.

Manufacturer Supervision: Where required, arrange for authorised manufacturers' representatives to be present on-site to inspect, verify, and approve equipment or system installation before startup. They should also supervise equipment placement and initial operation.

Startup Execution: Execute the startup process under the supervision of manufacturers' representatives and appropriate contractors' personnel, strictly adhering to manufacturers' instructions and best practices.

Comprehensive Reporting: Submit a comprehensive report documenting the proper installation and correct functioning of equipment. This report should include details of startup procedures, test results, any observed issues, and actions taken to address them.

Safety Precautions: Prioritise safety throughout the startup process, ensuring that all personnel involved are trained on relevant safety protocols and equipped with appropriate personal protective equipment (PPE).

Environmental Considerations: Consider environmental factors such as temperature, humidity, and ventilation requirements during the startup phase to optimise equipment performance and longevity.

Ongoing Monitoring: Implement protocols for ongoing monitoring and performance assessment of commissioned systems and equipment to identify any issues or inefficiencies early on and take corrective action as necessary.

2.1.4. Circuit Protection

Ensure that circuit protective devices, such as fuses, circuit breakers, and residual current devices (RCDs), are appropriately sized and adjusted to safeguard installed circuits against overcurrent, short circuits, and earth leakage.

2.1.5. Controls

Calibrate, set, and fine-tune control instruments, control systems, and safety controls to ensure accurate and reliable operation of building systems, such as HVAC (Heating, Ventilation, and Air Conditioning), lighting, and security systems.

2.1.6. Completion Tests

2.1.6.1. General

Conduct acceptance tests and final assessments to verify that all systems and equipment meet specified requirements and performance standards before handover to the client.

2.1.6.2. Functional checks

Perform functional and operational checks on energized equipment and circuits to ensure proper functionality and compliance with design specifications. Additionally, verify earth leakage tripping times and currents for residual current devices (RCDs) to confirm effective protection against electric shock hazards.

2.1.6.3. Trade Waste

Ensure that maintenance of the trade waste system, including both statutory and preventative measures, remains the responsibility of the installing contractor during the Post-Completion Period (PCP), ensuring ongoing compliance with regulatory requirements.

2.2. Independent certification of electrical installation

Engage an independent electrical certifier to inspect and test the electrical installation, providing independent certification of compliance with AS3000:2000 (Australian Wiring Rules). Testing should align with AS3017 and include mandatory and optional tests specified in section 6.3 of AS3000:2000, covering continuity, insulation resistance, polarity, incorrect circuit connections, fault-loop impedance, and verification of residual current devices' (RCDs) operation.

2.3. Cleaning

2.3.1.1. General

At practical completion, clean the following:

- Insides of switchgear and control gear assemblies to remove any dust, debris, or contaminants that may affect performance.
- Switchgear, contactors, and other electrical contacts to ensure optimal conductivity and reliability. Adjustments should be made as necessary to maintain proper operation.

2.4. Handover

2.4.1. General

The handover of a project to the client marks a crucial stage in the project delivery process, particularly for facilities managed by Charles Sturt University. It signifies the transition of responsibility from the contractor to the University, impacting various aspects such as health and safety, reliability, operational standards, maintenance, and cost efficiencies. Effective transfer of information and ownership is essential for successful facility operation.

Objectives:

- Ensure a well-organised, efficient, and effective transfer of project information and ownership to Charles Sturt University.
- Minimize disruptions to core University operations during the handover process.
- Facilitate seamless commissioning and fine-tuning operations to optimise facility performance.
- Enhance work health and safety standards during the transition phase.

2.4.2. Preliminaries

The project design consultants shall ensure that where there is a need for the provision of Works as Executed drawings and/or Operations & Maintenance Manuals. The Project Officer must coordinate a dedicated project meeting aimed at discussing the project handover process and reaching consensus on requirements and outcomes. This meeting should occur no later than four weeks before the proposed project completion date and, for larger projects, must be outlined and agreed upon as part of the Commissioning Plan. A standardised agenda for the meeting should encompass:

- Introduction and purpose of the meeting
- Collection of asset data
- Operations and Maintenance manuals (O&Ms)
- Connection and commissioning procedures
- Planning for systems operational training (including building operations such as evacuations)
- Ensuring licenses and certificates are in order
- Clarifying warranties and guarantees
- Addressing security systems and access control lists
- Verification of space use information
- Spatial data and drawing details
- Management of defects and after-hours callouts
- Maintenance protocols during the Post-Completion Period (PCP)

The project officer is responsible for convening this meeting with all relevant stakeholders, including architects, engineers, the head contractor, major subcontractors, and representatives from Charles Sturt University's Facilities Management team and project clients.

2.4.3. Practical completion

The concept of Practical Completion is specific to construction contracts and generally refers to the stage at which construction works are finished, except for minor defects that don't hinder their intended use. Additional criteria may also apply. Practical completion represents a distinct and well-defined phase within a project's contractual framework: either the works have achieved practical completion, or they haven't. Attaining practical completion in a construction contract is significant for various reasons, including:

- It prompts the release of a portion of performance security (bank guarantees) held by the principal.
- It marks the end of the contractor's liability to pay liquidated damages for delayed practical completion.
- It signifies the transfer of responsibility for the works to the principal.
- It terminates the principal's authority to make variations to the works.

A Certificate of Practical Completion will not be issued, and the project will not be released for occupation and use until the completion or fulfillment of the following five critical contracted activities:

1. Full connection and commissioning of all systems, machinery, and equipment, accompanied by the provision of all testing data and reports.

2. Submission of necessary licenses, certifications, and registrations as mandated by WorkSafe NSW, the BCA, or other pertinent legislation, prior to occupancy or acceptance of the project handover.
3. Establishment and confirmation of Post-Completion Period (PCP) maintenance management procedures, validated by the Project Officer.
4. Successful completion of training sessions, meeting the satisfaction of University representatives in each respective area of expertise.
5. Provision of as-constructed and/or as-removed information, at a minimum in draft form, before the project handover meeting. This includes asset data.

The Project Officer is responsible for the following internal activities (where required) prior to Practical Completion:

1. Notification to UniMutual (University insurer) regarding the addition of new buildings to the insurance register. This is to be facilitated through the Division of Finance.
2. Updating of master campus fire hydrant block plans and notification to local fire authorities.
3. Inclusion of the new building or refurbishment area on the cleaning schedule.
4. Internal communication to project stakeholders and University leadership.

2.5. Building Manuals

The objective of a Building Manual is to compile essential information and documented proof, facilitating safe usage, operation, maintenance, replacement, and potential demolition of the building throughout its designated life cycle. The Building Manual comprises four main Sub Manuals, each representing distinct providers and origins of pertinent data. These Sub Manuals include a Design Sub Manual, Development Sub Manual, Contractors Operations and Maintenance Sub Manual, and a User Sub Manual. Typically, each Sub Manual addresses the following aspects:

1. **Design Sub Manual:** Offers details to new owners and users regarding Safety in Design (SiD) reports, evidence of crucial design elements and performance-based solutions, limitations and capacities, operational and maintenance guidelines for new facilities, life cycle replacement plans, and demolition procedures.
2. **Development Sub Manual:** Compiles information beyond the scope of responsibility for both designers and contractors. This may include early planning consents, development approvals, special environmental considerations, land and strata title documents, and other data accessible to the owner or development team.
3. **Contractors Operations and Maintenance Sub Manual:** Consists of the traditional Operations and Maintenance (O&M) Manual provided by the Builder and their subcontractors. It should encompass asset schedules, operational and maintenance instructions, certificates, commissioning outcomes, warranties, spare parts lists, as-built plans, and related documentation.
4. **User Sub Manual:** Unlike the other manuals focusing on what could be termed as the Base Building, this manual caters to facility users. It should include floor plan copies, user guides covering aspects like access and security, safe appliance usage guidelines, and other information pertinent to the needs of that user group.

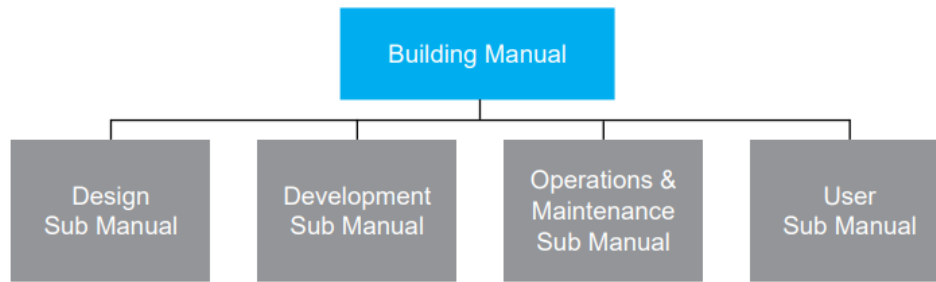


Figure 1: Building Manual Structure.
 Source: Australian Building Manual Guideline Version 1.2

2.5.1.1. Design Sub Manual

The design process progresses through various stages, starting from the initial concept, advancing through schematic design, and culminating in the final design. The number of stages may vary depending on the complexity and scale of the project.

The Design Sub Manual is divided into sections or chapters, each dedicated to a specific design discipline such as Architectural, Mechanical, Electrical, Lifts, Structural, Hydraulics, and Fire Services.

For each designer, the chapter headings within their respective sections should encompass:

Section Heading	Content
Purpose & Objectives	Description of the new facilities purpose, capabilities, capacities, limitations
Consultant Details	Consultant team contact details
Design Development Reports	Each Design Stage, (e.g. Concept, Schematic, Final) Scope or brief Results of design and product research and investigation.
<ul style="list-style-type: none"> • Introduction • Findings • Options • Safety in Design (SiD) 	Assessment of design options and products selected SiD Subheadings: <ul style="list-style-type: none"> • Scope and Objectives • Research • Risk Assessment • Actions Taken
Recommendations	Design option recommendation for each stage
Safety in Design (Amendments)	<ul style="list-style-type: none"> • Changes to Design affecting SiD and product selection during construction, e.g., changed material selections • Revised Risk Assessments • Actions Taken
Owners Instructions	Instructions to the Owners/Users on how the completed works are to be safely operated, maintained, demolished and any life cycle considerations
Attachments	Copies of relevant documents, evidence of research, plans, photos, scope changes, product information, data sheets, performance and deemed to satisfy design solutions, progressive construction compliance inspection certificates.

Figure 2: Design Sub Manual Structure.
 Source: Adapted from the Australian Building Manual Guideline Version 1.2

2.5.1.2. Development Sub Manual

The Development Sub-Manual compiles essential information and documentation that typically isn't supplied by either the designers or the contractors. This owner-related data holds significant importance, especially during due diligence processes.

Section Heading	Content
Purpose & Objectives	Description of the new facilities purpose, capabilities, capacities, limitations and the like
Development Details	Development team contact details, project address
Planning Assessments	Development and environmental assessments
Planning Approvals	Development approvals, environmental consents, other
Utilities Approvals	Power, water, gas, sewerage, telecommunications
Other Authorities	Road, rail, air, defence, crown
Land Titles	Land title plans, strata titles, bylaws, subdivisions, easements, deeds, survey plans
Other Conditions	Adjoining owner protection or access, local government, special access, security, fire, life safety and maintenance agreements
Other Documents	Land and Development valuations, insurance policies in place, pre-existing Agreements (Management, licences, leases)
Final Certificates	Design and Installation Certifications, Compliance documents, Occupancy Certificates, Schedule of Essential Services (fire and life safety)
Project Warranties	Designer warranties, Contractor Warranties, copies of insurance certificates, e.g. Professional indemnities, Builders Warranty Insurance, Defect Bonds etc
Attachments	Copies of relevant documents, certificates, plans, approvals, reports

Figure 3: Development Sub Manual Structure.
Source: Adapted from the Australian Building Manual Guideline Version 1.2

2.5.1.3. Operations and Maintenance Sub Manual

The Operations and Maintenance (O&M) Sub-Manual typically consists of distinct sections or chapters, each prepared by specialised subcontractors in their respective trades. In certain jurisdictions, only licensed tradespeople are authorised to provide this information.

Examples of Trade Manuals include:

- Mechanical Services: Covering air conditioning systems, heating, and cooling.
- Electrical Services: Detailing electrical distribution, switchboards, lighting, and emergency power.
- Electrical or Dry Fire: Focusing on smoke and thermal detection systems (though this may be the responsibility of an electrician, it should not be integrated into the general electrical manual).
- Hydraulics Services: Addressing water and sewer systems, stormwater drainage, taps, sanitary ware, hot water, and water and effluent treatment.
- Hydraulic or Wet Fire: Concerning hydrants, hose reels, extinguishers, sprinklers, and similar systems (though this may be the responsibility of a plumber, it should not be included in the general hydraulics or plumbing manual).

- Lifts and Escalators: Covering vertical passenger and goods lifts, escalators, travelators, hoists, etc.
- Floor Finishes: Detailing carpets, tiling, timber boards, vinyl, terrazzo, etc.
- Roofing: Including tiled, metal, membrane roofing, as well as internal gutters and downpipes.
- Waterproofing: Providing information on systems/products used, test and verification documents, product data sheets.
- Safety Systems: Addressing roof and high-level safe access systems, harnesses, anchors, etc.
- Other Trades: Where information is necessary to verify proper installation and operation, maintenance, product safety data, warranties, and as-built documents.

This list serves as an illustrative example. The specific scope of work for each project and the breakdown of various trade packages will determine the precise extent of Trade Manuals required.

Section Heading	Content
Purpose & Objectives	This is a basic introduction about the project, the builder, and the scope of work documented in the manual
Assets	Record information describing items of equipment, assets, or elements of the work
Maintenance	Documents the maintenance schedules and tasks required to maintain a piece of equipment/assets and hence prevent breakdown and/or meet compliance and manufacturer requirements.
Operations	This section should be used to record relevant information on the Operations of the system and or assets. It should also include important safety instructions, product information, special tools, cleaning and operating instructions and troubleshooting to assist in solving problems to prevent expensive call outs.
Commissioning	Important test results and performance criteria relating to commissioning and operations should also be included
Certificates	Record and upload copies of certificates and other required certifications
Warranties	Record specific warranty and certificate reference information
Spare parts	Record any relevant information on the Spare Parts data for the assets provided as part of the contract. It may also include information on spare parts suppliers
Help and contact	This section should be used to record information to allow the Client to call for expert assistance in relation to the assets included in the project. This would include the main contractors, sub-contractors and suppliers
Drawings and references	This section allows you to attach/bind and or upload information like as-built plans, copies of specifications, complete product manuals and other documents relevant to the works and the O&M Sub-Manual

Figure 4: Operations and Maintenance Sub Manual Structure.
Source: Adapted from the Australian Building Manual Guideline Version 1.2

2.5.1.4. User Sub Manual (Orientation Guide)

This will be a co-authored document which will be provided to building users as a resource to complement building induction and training that will be facilitated by the Project Manager and Campus Facilities Manager along with specialist staff (building function dependant). The Project Officer will coordinate the development of this document with information supplied from the Head Contractor along with existing University resources. It is important that building users are encouraged to provide feedback on the user manual and suggestions for improvement.

Section Heading	Content
Introduction	<ul style="list-style-type: none"> • Welcome message from University leadership / Project Manager. • Overview of the purpose and contents of the user manual.
Building Overview	<ul style="list-style-type: none"> • Description of the building, including its location, architecture, layout, and key features. • Floor plans indicating the location of offices, common areas, facilities, and emergency exits.
Access and Security	<ul style="list-style-type: none"> • Guidelines for accessing the building, including operating hours and entry procedures. • Overview of security protocols, such as key card access, visitor registration, and emergency response procedures.
Building Amenities	<ul style="list-style-type: none"> • Description of amenities available to occupants, such as: <ul style="list-style-type: none"> ○ Collaboration spaces ○ Kitchen facilities ○ Restrooms ○ Parking facilities ○ Accessibility
Building Systems	<ul style="list-style-type: none"> • Detailed information on the operation and maintenance of building systems, including: <ul style="list-style-type: none"> ○ HVAC (Heating, Ventilation, and Air Conditioning) systems ○ Lighting and electrical systems ○ Plumbing and water supply systems ○ Fire protection and life safety systems ○ Elevators and escalators ○ Waste management and recycling facilities ○ Building-specific systems (i.e. laboratories)
Equipment & Systems	<ul style="list-style-type: none"> • Instructions for setting up and personalising workspaces, including ergonomic considerations. • Guidelines for using shared facilities and equipment responsibly. • Policies regarding noise levels, cleanliness, and environmental sustainability.
Technology and Connectivity	<ul style="list-style-type: none"> • Information on IT infrastructure and connectivity options available within the building. • Guidelines for accessing Wi-Fi networks, using printers and other office equipment.
Safety and Emergency Procedures	<ul style="list-style-type: none"> • Emergency contact information for building wardens, facilities management, security personnel, and emergency services. • Procedures for evacuating the building in case of fire, natural disasters, or other emergencies. • Instructions for using fire extinguishers, emergency exits, and evacuation routes.
Maintenance and Facilities Management	<ul style="list-style-type: none"> • Procedures for reporting maintenance issues, including who to contact and how to submit a service request. • Guidelines for keeping shared spaces clean and tidy, including waste disposal and recycling procedures. • Information on scheduled maintenance activities. • Contact information for submitting feedback and inquiries about the manual.
Campus and Community Resources	<ul style="list-style-type: none"> • Information on nearby amenities both on and within proximity to campus, such as cafes, shops, and public transportation options. • Listings of campus services and resources available to building occupants (campus-specific).
Attachments	<ul style="list-style-type: none"> • Additional resources as required, such as glossaries of terms, troubleshooting guides, and contact lists for services, links to University websites (e.g., https://www.csu.edu.au/emergency)

Figure 5: User Sub Manual Structure.

Sources: Adapted from the Australian Building Manual Guideline Version 1.2 and Charles Sturt University Facility Orientation Guide

2.6. Training

2.6.1. General

Comprehensive training sessions covering operational procedures, familiarisation with the facility, and maintenance protocols will be conducted. These sessions will be tailored to meet the needs and expectations of both occupants and University representatives across various areas of expertise. The aim is to ensure that all stakeholders are adequately prepared and satisfied before the works are handed over for occupation or use.

The following guidelines govern the training process for contractors:

- Contractors are required to submit a preliminary training program to the project officer for each system or specialised plant item. This submission should align with the commissioning program and ideally be completed prior to the pre-project handover meeting, which is scheduled at least four weeks before the proposed handover date.
- Alongside the proposed program, contractors must provide sample training documentation. This should include comprehensive training materials such as as-installed drawings and operation and maintenance manuals, forming the foundation for effective training.
- Final training session dates will be coordinated and confirmed in consultation with the Project Manager and relevant stakeholders. This ensures the availability of both contractor and Charles Sturt University representatives.
- Trainers must possess the necessary qualifications and competence. Preference will be given to individuals who are manufacturer's representatives or have received training directly from manufacturers, demonstrating comprehensive knowledge of the installations/systems.
- Adequate and tailored training arrangements must be made for early, partial, or staged handovers. Special attention should be given to critical areas such as building evacuation procedures and plant and equipment installations that serve beyond the defined project works. Feedback from early handovers will inform adjustments and enhancements to the final project handover training program. This is especially crucial for installations like new fire indicator panels, which impact the entire building despite being part of partial refurbishments.

2.6.2. Operations

The project team should provide thorough explanations and demonstrations to Charles Sturt University's Facilities Management Operations staff regarding the purpose, function, and operation of the installations. This process typically involves each major sub-contractor and/or consultant conducting formal handover sessions, which should cover the following:

- General overview of the systems concept and operational targets.
- Detailed understanding of main system components.
- Understanding of the controls strategy.

Immediately following Practical Completion, further explanations and demonstrations should be provided to Charles Sturt University's Facilities Management Operations regarding the purpose, function, and maintenance of the installations with specific focus on the following areas:

Safety Procedures and Emergency Protocols: Ensure that staff are familiar with safety procedures and emergency protocols related to the operation and maintenance of installations. This includes information on emergency shut-off procedures, evacuation routes, and protocols for handling hazardous materials.

Troubleshooting and Problem Resolution: Provide guidance on troubleshooting common issues that may arise during the operation of installations. Staff should be equipped with the knowledge to identify problems, contact appropriate personnel for assistance, and resolve issues efficiently to minimise downtime.

User Manuals and Documentation: Stress the importance of referring to user manuals and documentation provided by equipment manufacturers. Staff should be encouraged to consult these resources for detailed instructions on operation, maintenance, and troubleshooting of specific systems and components.

Training Materials and Resources: Offer additional training materials and resources to supplement formal handover sessions. This could include video tutorials, interactive simulations, or online courses covering specific aspects of operation and maintenance.

Ongoing Support and Training Opportunities: Highlight the availability of ongoing support and training opportunities for staff after the handover process. This may include regular training sessions, refresher courses, or access to technical support resources provided by the project team or equipment suppliers.

Feedback and Continuous Improvement: Encourage staff to provide feedback on the training process and identify areas for improvement. Establish channels for collecting feedback, such as surveys, suggestion boxes, or scheduled meetings, to ensure that training programs evolve to meet the changing needs of staff.

Maintenance records should be organised in binders, featuring loose-leaf logbook pages tailored for documenting completion activities. These records should encompass operational and maintenance procedures, materials used, test results, future maintenance recommendations, and installation conditions. Additionally, certificates, test approvals, and comments on system functionality, corrective actions, and adjustments made during service visits should be recorded, with the principal's designated representative providing their signature.

2.7. Maintenance

To ensure the longevity and optimal functioning of plant and equipment, any new specifications must incorporate standard clauses for preventative maintenance, as agreed with the Director, Facilities Management. This maintenance program should run throughout the Post-Completion Period (PDP), comprising periodic inspections and maintenance tasks recommended by equipment manufacturers. Additionally, the contract should stipulate that the successful contractor must promptly address urgent matters designated by the University during this period.

2.7.1. Maintenance Program

Six weeks before practical completion, the project team is required to submit detailed maintenance procedures and a program concerning installed plant and equipment to Facilities Management Operations. This program should outline service visit dates, provide contact information for service operators, and delineate emergency response protocols.

2.7.2. Maintenance Records

Upon completion, maintenance records should be organised in binders, featuring loose-leaf logbook pages tailored for documenting completion activities. These records should encompass operational and maintenance procedures, materials used, test results, future maintenance recommendations, and installation conditions. Additionally, certificates, test approvals, and comments on system functionality, corrective actions, and adjustments made during service visits should be recorded, with the principal's designated representative providing their signature.

2.7.3. Referenced Documents

If referenced documents or technical sections necessitate the submission of logbooks or records, this material must be included in the maintenance records for comprehensive documentation.

3. Supporting Documentation

These below lists are not all-inclusive and those associated with the project are responsible for identifying and complying with all standards relevant to the scope of works.

3.1. Supporting Legislation

- Work Health and Safety Act 2011 (NSW)
- Work Health and Safety Regulation 2017 (NSW)
- Work Health and Safety Act 2011 (ACT)
- Work Health and Safety Regulation 2011(ACT)
- Environmental Planning and Assessment Act 1979 (NSW)
- Building and Construction Industry Security of Payment Act 1999 (NSW)
- Building and Construction Industry (Security of Payment) Act 2009 (ACT)
- Building Act 2004 (ACT)
- Planning and Development Act 2007 (ACT)
- NSW Local Government Local Environmental Plans (LEP)

3.2. Supporting Standards

Standard Number	Standard Title
AS/NZS 1668 Series	The use of ventilation and air conditioning in buildings
AS/NZS 3598.1:2014	Energy audits, Part 1: Commercial buildings
AS / NZS 3666 Series	Air-handling and Water Systems of Buildings
AS 4122-2010	General Conditions of Contract for Consultants
AS 4300-1995	General conditions of contract for design and construct
AS 4349.2:2018	Inspection of buildings, Part 2: Group titled properties
SA TS 5342:2021	Technical specification for building commissioning
AS/NZS ISO 9001:2016	Quality management systems – Requirements
AS/NZS ISO 14001:2016	Environmental management systems - Requirements with guidance for use
ISO 19115-1:2014	Geographic information - Metadata - Part 1: Fundamentals
ISO 19165-1:2018	Geographic information - Preservation of digital data and metadata - Part 1: Fundamentals
AS/NZS ISO 31000:2009	Risk management - Principles and guidelines
AS ISO 19650 Series	Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) - Information management using building information modelling.
AS ISO 21500:2022	Project, programme and portfolio management - Context and concepts
AS ISO 55001:2014	Asset management - Management systems – Requirements

Standard Number	Standard Title
AS ISO 55002:2019	Asset management - Management systems - Guidelines for the application of ISO 55001

3.3. Industry Codes of Practice

Work Health and Safety (Construction Work) Code of Practice 2015

<https://www.legislation.gov.au/F2016L00394/asmade/2016-03-30/text/original/word>

SafeWork NSW Code of Practice Construction Work (2019)

https://www.safework.nsw.gov.au/_data/assets/pdf_file/0014/52151/Construction-work-COP.pdf

NABERS (National Australian Built Environment Rating System)

<https://www.nabers.gov.au/>

3.4. University Documentation

Charles Sturt University Facilities and Premises Policy

<https://policy.csu.edu.au/document/view-current.php?id=465&version=1>

3.5. Other Resources

Australian Building Codes Board Building Manuals (2021)

<https://www.abcb.gov.au/sites/default/files/resources/2021/BCR-rec20-Building-manuals.pdf>

Australian Building Manual Guideline (2020)

<https://www.buildingmanuals.org/wp-content/uploads/2020/03/Building-Manual-Guideline-V1-3-Web.pdf>

The Australian Building Codes Board Building Confidence Report (2021)

<https://www.abcb.gov.au/sites/default/files/resources/2022/Building-confidence-report-case-intervention.pdf>