UNIVERSITY OF CANBERRA

DOCUMENTATION STANDARDS

ASSET INFORMATION REQUIREMENTS

Campus Estate

July 2022

Document Authorisation

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TABLE OF CONTENTS

CAMPUS ESTATE DOCUMENTATION STANDARDS - Asset Information Requirements

PURPOSE

The purpose of this document is to define the minimum standards for documentation and asset information to be prepared and submitted to the University of Canberra (UC) and Campus Estate under contractual obligations for capital works, minor works, tenancy agreements and services works.

Campus Estate manages the property, infrastructure and operation of UC's assets to align with the University's strategic vision and to provide a safe and appropriate physical environment for the University community.

When any asset is handed over to UC, it must be accompanied with accurate set of asset data and minimum documentation as defined within these guidelines, and in accordance with relevant Australian Standards, design standards and contractual agreements.

SCOPE

These specifications apply to all staff, contractors, consultants and sub-ordinates providing documentation to Campus Estate or the Leasing team.

This documentation standard sets out the minimum asset information requirements that applies to all University projects and all project disciplines. Building Information Modelling (BIM) requirements as described in Section 8, may be required for specific projects at the discretion of the University.

The following document types that should be prepared, but not limited to for each project in accordance with this standard include:

- Drawings and 3D Models (using the Campus Architectural Planning Series base floor plans, as a basis for design)
- Operations and Maintenance Manuals (includes Data Sheets, Manufacturer's Literature)
- Technical Reports, Specifications, Certificates & Warranties
- Registers (includes Asset Register, Drawing Register, Asbestos/WH&S Registers)
- Transmittals
- Forms

1. Document Submission Process

All documentation must be delivered in electronic format unless hardcopy files are specifically requested by UC. Electronic files shall be issued to Campus Estate using the below methods in preferred order:

1. Lunr UC Content Management System – URL: https://documents.lunr.app/ Team Name: uc
2. Cloud storage system, e.g. Aconex, Procore, RedHub

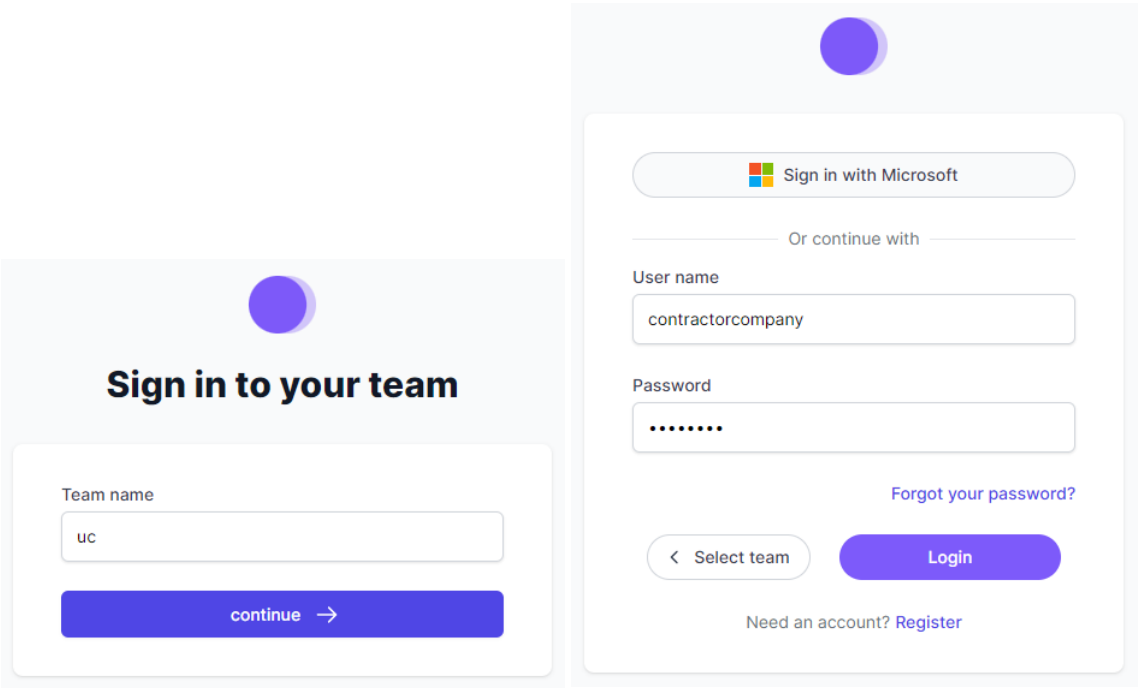

Figure 1:Lunr User Login

Under no circumstances are files to be provided on CD / DVD or USB, or within cloud storage systems not based in Australia, such as Dropbox and Google Docs.

All authorised persons below must be notified of document submission within Campus Estate:

- Nominated UC Project Manager and Digital Systems Coordinator
- Campus Development and Planning Team spaceplanning@canberra.edu.au
- Operations and Maintenance Team oandm@canberra.edu.au

The selected cloud storage system must be secure (password protected with a 2-step verification process) and confidential.

Files must be provided for review and acceptance throughout the project lifecycle and at the request of the authorised persons above. Illegible or poor-quality documentation will not be accepted.

2. Requests for Information (RFIs)

During the project, nominated staff, contractors, consultants and sub-ordinates providing documentation to Campus Estate should request information existing on UC's systems. The RFI process shall be determined at project start-up.

In some circumstances, UC may allow for affiliate access to its asset information systems due to extensive nature of data that can be available for projects.

3. Campus Estate Built Records and Systems

It is important that all documentation and drawings integrate with UC's existing built records systems. These records assist with RFIs and future project developments.

3.1 Asset or Operational Data

The University is required to record all asset information, including buildings, infrastructure, services, operations, maintenance for asset and facilities management purposes, this includes:

- Traditional documentation, such as drawing renditions, specifications, operations and maintenance (O&M) manuals, service records and defects registers or forms. Noting that many of these records are scanned originals that are archived within SharePoint and may not meet current digital standards.
- Digital documentation, such as CAD drawings, models, GIS geodatabases, laser scans, photogrammetry, asset registers and integrated asset information within systems as detailed in Table 1 below.

3.2 Built Environment and Space Data

The University maintains all building records for various disciplines within its recordkeeping systems. In addition, UC uses GIS for space planning and estate management purposes to identify functionality, usability, occupancy and size of spaces, refer to UC's GIS Space Inventory https://canberra.maps.arcgis.com/apps/webappviewer/index.html?id=b5b4da31e7aa4faa81bf64813a156108.

3.3 Workplace Health and Safety and Environment Data

The University is required by law to maintain hazardous materials and confined spaces registers. The hazardous materials register includes asbestos, chemicals and other materials as to identify hazardous materials to ensure a safe workplace in compliance with the *ACT Dangerous Substances (General) Regulation 2004*.

Table 1: UC Business Information Systems

System	Related Software	Documentation
Building Information Modelling (BIM) System	Autodesk Revit Skand https://app.skand.io	BIM Models
Building Management System or Integrated	Optergy	Operations and Maintenance Procedures
Computer Aided Drafting (CAD) System	AutoCAD 2018 or Later Autodesk Suite (AutoCAD, Revit or Inventor) Lunr Drawing Management System	CAD Drawings or Models
Computerised Maintenance (Asset) Management System (CMMS)	iVivaCloud https://iviva.canberra.edu.au	Asset Register
Contractor Prequalification System	Cm3 https://www.cm3.com.au	WHS Documentation (SWMS, JSA) Insurances
Electronic Document / Records Management System	Lunr - Team Name: uc SharePoint • Building Directory (for Building documents only – no drawings)	Operations and Maintenance Manuals, Drawings, Certificates Project Documents (Active Projects), Registers, Reports. Records Contract Management

System	Related Software	Documentation
	• Project Management Information System (PMIS) HPE Content Manager	
Geographic Information System (GIS)	ESRI ArcGIS (ArcMap, ArcGIS Pro and ArcGIS Online) • Grounds • Utilities • Space Inventory	Utilities Management Space Inventory Wayfinding Other Maps, including Ecological and Heritage Register, Tree Register

4. Intellectual Property

The University reserves the right to use all documentation and information without restriction, except for tender documentation and any specific design elements or inventions that will be preserved from outside sources.

Any documentation for safe operation and maintenance must be available to use without restriction.

5. General Information Requirements

The following information is required by the University throughout the project lifecycle at various gated stages to ensure that UC is operationally aware and to improve the operational effectiveness of the University's assets:

- Drawings (2D and 3D)
- Operations and Maintenance (O&M) Manuals
- Building Emergency data
- Building Information Model (BIM) and COBie data
- Maps, Geodatabases or GIS Shapefiles
- Asset data for the CMMS

6. Documentation Development / Revisions

Each document revision must be electronic files submitted through Lunr UC Common Data Environment (Lunr). The Digital Systems Coordinator can be contacted to obtain access.

At design stages, documents may be submitted as rendered documents (PDF). Construction documentation and final handover documents must be submitted in their original format no later than four (4) weeks after practical completion.

Table 2: Document / Drawing Filetypes Required at Gated Stages

Gate	Project Stage	Document Status	Drawings	O&M Manuals, Registers, Reports	Certificates
1	Initiation / Feasibility	Preliminary Design	PDF	PDF	PDF
2	Concept Design	Development Application (Issued for Review)	PDF	PDF	PDF
3	Detailed Design	Development Approval (Issued for Approval)	PDF	DOCX, XLSX, PDF	PDF
4	Construction Procurement & Tendering /	Tender Issue (Issued for Tender) Construction Issue (Issued for Construction)	DWG, RVT & PDF	PDF	PDF

Gate	Project Stage	Document Status	Drawings	O&M Manuals, Registers, Reports	Certificates
	Construction & Delivery				
5	DLP & Closure	Final (As-Built or Work As Executed)	DWG, RVT & PDF	DOCX, XLSX, PDF	PDF

7. Asset Information and Design Requirements

7.1 Design Standards and Specifications

Refer to the University of Canberra Design Standards as a basis of design of all assets. Currently this document is under development, please contact CampusEstate@canberra.edu.au.

7.2 Master Plan

UC has developed a Campus Master Plan 2020-2040 that holds a vision for the university to be a vibrant, diverse, and sustainable learning community. All projects will ensure this is considered to layer the foundations for a refurbished and revitalised Campus that is distinctive in design, see the UC Campus Master Plan: https://www.canberra.edu.au/campus-master-plan.

7.3 Asset Identification

7.3.1 Building, Level & Room Numbering Standards

Refer to the Standards for the Building, Level and Room Code Standards, Bruce Campus as a basis for determining building, level and room numbers. Requests for numbers shall be emailed to spaceplanning@canberra.edu.au and include the proposed floor plan as a CAD drawing file with all internal walls shown.

7.3.2 Locations

Document metadata shall include a location or site reference as the University of Canberra has a building portfolio outside of the main Bruce Campus.

Location Description	Location Code	Building Description	Building Code
Main Campus or Bruce Campus	MC	Building 1	001
		Building 2	002
		Building 3	003
		Building 4	004
		Building 4a	004A
		Building 5	005
		Building 6	006
		Building 7	007
		Building 8	008
		Building 9	009
		Building 10	010
		Building 11	011
		Building 12	012
		Building 13	013
		Building 13a	013A
		Building 13b	013B
		Building 13c	013C

Location Description	Location Code	Building Description	Building Code
		Building 14	014
		Building 15	015
		Building 16a	016C
		Building 16b	016B
		Building 16c	016C
		Building 16d	016D
		Building 17	017
		Building 18	018
		Building 19	019
		Building 20	020
		Building 22	022
		Building 23	023
		Building 24	024
		Building 25	025
		Building 27	027
		Building 28	028
		Building 29	029
		Campus Grounds	000
Campus Community	CCP		
Canberra Specialist Medical Centre	CSMC		
Kirinari Early Childhood Centre	CCKI		
Residential (Campus West)	RE	Bimbimbie (Vice Chancellor's) Residence	BIM
		Buru (Residences A to H)	BU (A-H)
		Cooinda Hut (Formerly Building 21)	COO
		Cooper Lodge	CL
		Dyara (Student Village)	DY (SV)
		Guginya (Campus Living Village)	GG (CLV)
		Gurubun (International House)	GB (IH)
		Mulleum (College House)	ML (CH)
		UC Lodge	UCL
		Wagan (Residences I to N)	WG
Residential (Off-campus)	RE	Arscott House *(Demolished)*	ARS
		Bega Student Accommodation	BGA
		Cooma Student Accommodation	CMA
		Eden Student Accommodation	EDN
		Moruya Student Accommodation	MYA
		Narooma Student Accommodation	NRM
		Weeden Lodge North	WLN
		Weeden Lodge South	WLS
UC Hospital	UCH		
Training Facilities	TF	Bega Clinical Training Facility	BGA
		Cooma Clinical Training Facility	CMA
		Moruya Clinical Training Facility	MYA
		Jervis Bay Research Facility	JB

7.3.3 Other Asset Coding Requirements

UC uses an asset register to identify all individual assets and equipment. It is expected that the consultant, contractor or service provider will provide the asset register that will determine the hierarchical levels and processes that will determine the naming convention or identifier that will be referenced in all documentation.

8. Drawings

8.1 Asset Identification

This section describes the requirements for drawings prepared for submission to UC under contractual obligations using an approved Computer Aided Design (CAD) drafting package specified in Table 1: UC Business Information Systems.

8.2 Standard CAD Systems and File Formats

UC requires all drawings to be submitted in any of the original CAD drawing formats listed below. At a minimum no later than four (4) weeks after practical completion of the project or handover of works (minimum requirement). It is expected that drawing files be supplied at earlier stages of the project or development for planning and compliance with this standard using the Lunr UC Common Data Environment.

Table 3: Drawing Filetypes Accepted

Program Name	File Format Accepted	Other Formats Accepted
AutoCAD	DWG (2013 format minimum)	PDF (Design Only)
ArchiCAD	DWG	PDF (Design Only)
Autodesk Revit	RVT	DWG, PDF (Design Only)
Autodesk Inventor	IPT/IAM/IPN/IDW	DWG, PDF (Design Only)

8.3 Disciplines

UC requires the following drawings to be grouped in order for each discipline:

Table 4: Drawing Disciplines and Drawing Types

Discipline	Drawing Type
General/Civil	Cover Sheet & Drawing Schedule Site Plan Demolition Plan
Discipline	**Drawing Type**
Architectural	Demolition Plan (for internal and external walls) Floor Plan Elevation Section Details Reflected Ceiling Plan
Mechanical	Mechanical Floor Plan/Layout (Mechanical Services Only) Schematic Diagram Details Notes
Electrical	Electrical Floor Plan/Layout (Electrical Services Only) Schematic Diagrams Cabling Block Diagram Network Diagram Single Line Diagram Switchboard Details Notes
Hydraulic (Plumbing)	Hydraulic Services Plan (Water, Sewer, Stormwater, Irrigation) Sanitary Drainage Plan Section

	Details Notes
Structural	Details Section/Elevation Notes
Gas	Site Plan Details
Fire Protection	Block Diagram Evacuation Diagram Emergency Warning & Intercommunication Systems (EWIS) Details
Survey	Deposited Plan Lease Plan / Declared Sublease Plan Survey Plan (Series)
Landscaping	Landscaping Site Plan Landscaping Planting Plan Landscaping Details
Parking & Traffic	Site Plan Parking Plan Temporary Traffic Management Plan
BMS	Network Diagram Schematic Diagram
WHS	Asbestos Management Plan Dangerous Goods Evacuation Plan Fire (Alarm) Zone Plan Hazardous Materials Management Plan

8.4 Survey Drawings

Survey drawings required for submission to Access Canberra or NSW Land Registry Services, including Deposited Plans or Lease Plans must meet the requirements of these authorities and the *Surveyors Act 2007*.

8.4.1 Deposited Plans and Lease / Sublease Plans

Deposited plans for the Bruce Campus and southern NSW facilities are registered with ACT and NSW Land Titles Offices. Deposited plans require a registered Surveyor to use survey controls to identify parcel(s) of land and locate existing survey marks or monument features to define site boundaries. The Deposited plan is lodged and registered with Access Canberra or NSW Land Registry Services.

Lease plans or sub lease plans require a registered Surveyor to determine the area of land within the Crown lease for survey of new and existing commercial properties and retail tenancies across the campus. The process involves reviewing against previous plans archived within the Lunr or UC's SharePoint document management system and registered with the ACT Land Title Office and delivering plans using 3D laser scanning and CAD. All sublease plans are measured to the Method of Measurement guidelines produced by the Property Council of Australia (PCA) for Lettable Area.

8.4.2 University Survey Requirements

UC may request survey identification and topographical plans and 360 degree spherical photography or photogrammetry for inclusion into Campus Master Plan and Utilities Plan sets for external features. Features include, but are not limited to, buildings, outstructures, substructures, landforms (contours, levels), roads, kerbs, pathways, stairs, outdoor furniture, signage, trees and all utility assets above ground and underground. Campus Estate will advise of the project brief and scope of works if included as part of projects. Each survey will need survey control establishment and coordination, and if utilities need to be identified or if there likely impact during construction, the survey additionally requires underground services detection and depth of pipes, investigation pit reporting, and potentially condition hydro-excavation potholing or condition rating reports. For newly formed services, tracer wire needs to be installed as to locate the services at a later date.

For internal spaces, it is recommended that a 3D laser scan is conducted prior to installation of partition walls as to locate building services and a laser scan of all internal walls at the completion of the project as to check the As-Built for accuracy and completeness.

8.5 Drafting Standards

8.5.1 Drawing Templates

UC shall provide a setup file as part of the contract or works to standardise drawing construction of all CAD files. This setup file involves a drawing template (DWT) file that includes:

- Standard layers
- Text styles
- Linestyles
- Dimension and multi-leader styles
- Standard drawing borders (that may be used as a replacement to company title blocks)
- Drawing menu (to construct Campus Planning Series drawings and infrastructure pipelines)
- Standard blocks and symbols
- Colour dependent plotter/printer (CTB) lineweight file
- Drawing Register

8.5.2 Drawing Borders

UC may request the use of the UC standard drawing border. In any case, a title block must be inserted as a block into the paperspace layout. UC does not accept drawings with title block as an external reference file into the layout.

All drawing borders shall be either be A1, A2, A3 or A4 size to AS 1100 standard.

All drawing borders shall use attributed variable fields that are to modified using block properties or the "ATTEDIT" command for input of drawing information.

Where possible, logos shall be drawing blocks or embedded images without external reference.

8.5.3 Drawing Numbering Convention

When submitting CAD files and models, drawing numbers and/or file names shall accurately identify the project.

Drawing number format: [Facility][Building Number/Name][Level]-[Discipline]-[Identifier]

Example: MC001A_A-202001

Where the identifier is the internal project/drawing number the consultant/contractor requires.

Table 5: Drawing Number Convention (MC001A_A-202001)

Facility	Building Number	Level	-	Discipline	-	Project/Drawing Number (ID)
MC	001	A	-	A	-	Example: 202001

Refer to Appendix 1 for Drawing/Document Numbering Convention.

8.5.4 Drawing and BIM Model File Naming Convention

File names of drawings and models shall be named according to the drawing numbering convention with the revision included.

Example: MC001A_A-202001_a.dwg MC001A-A-202001_a.rvt

Drawing titles shall be defined in the drawing register and is not required in the file name.

8.5.5 Hybrid Files

All image attachments or external references should be provided, preferably embedded or bound to the master drawing file within Lunr, or provided as a zipped file in an eTransmittal to UC.

8.5.6 Drawing Register or Document Transmittal

The Drawing Register or Document Transmittal is to be included under the Drawings Section in the Operations and Maintenance (O&M) Manual. This should list all finalised versions and identifies all drawings and BIM models.

Proprietary document transmittals are not acceptable as a replacement to the drawing register unless all metadata listed below is included:

Table 6: Drawing Register / Document Transmittal Metadata Requirements

Field
File Name
Drawing Number
Drawing Title (Combined)
Title Line 1

Title Line 2
Title Line 3
Title Line 4
Title Line 5
Building (Building Number or Name)
Floor Level
External Party (Consultant Name)
Discipline
Status (Reason for Issue)
Month
Year
Asset Number(s)
Revision Number
Neighbourhood (As per Campus Master Plan 2020-2040)

8.5.7 Drawing Scales, Units and System Variables

All drawings will be drawn to actual (1:1) scale in model space and presented to following standard scales (reduction ratios) in paper space.

Table 7: Standard Drawing Scales

Drawing Type	Preferred Scale	Units of Measurement
Details/Sections	1:10, 1:20, 1:25, 1:50	1 unit = 1mm (millimetre)
Floor Plans	1:100, 1:200	1 unit = 1mm (millimetre)
Building Site Plans	1:200, 1:500, 1:1000	1 unit = 1m (metre)
Campus Site Plan/Location Plan	1:1000, 1:2500	1 unit = 1m (metre)

8.5.8 System Variables and Command Settings

The following system variables or command settings (in particular for AutoCAD) are required to be set for all drawings:

Table 8: System Variables and Command Settings

Drawing Units		
Measurement	Unit:	1 (mm or m)
Length	Type:	Decimal
	Precision:	0.000
Angle	Type:	Decimal Degrees
	Precision:	0.00 clockwise
	Direction:	
Direction	Base Angle:	East 0°00'00"
Drawing Commands		
Linetype Scale	LTSCALE:	1.0

8.5.9 General CAD Drafting Requirements

The construction of drawings within the project set should be identical in structure with the use of the setup file at Section 4.3.1 and use of notation is required as to ensure familiarity with the drawing set. All drawing objects, including lines, polylines, block, symbols, circles and arcs are to be created or inserted using the object snap command to ensure all vector data connects correctly and the drawing is presented in a professional manner. Each drawing within the project shall be presented as a separate file in accordance with the file naming conventions, see Section 8.3.3 and 8.3.4. Under no circumstances will multiple paperspace layouts be shown in a single CAD drawing file.

Use blocks to create standard symbols, cross references and duplicate details.

At drawing submission, the "PURGE" function by purging all items to minimise file sizes and remove all extraneous layers, lines, blocks and other objects.

8.5.10 Survey Requirements

All survey and "Work As Executed" site plan and infrastructure drawings shall be submitted in a format enabling import to the UC Geographic Information System (GIS) as follows:

- Drawing units shall be in metres.
- Drawings shall use real world coordinate systems, in particular the ACT Standard Grid coordinate system with progression towards GDA 2020.
- Sites outside the ACT region, such as Jervis Bay are to use the GDA 2020 projection.
- Survey lease, sublease and deposited plans to meet ACT Surveyor General and NSW Registrar General Guidelines.
- Provide levels true to the Australian Height Datum (AHD).
- Where possible ensure all drawings are showing north up the page.
- Survey tolerance to conform to AS 5488 Australian Standard "Classification of Subsurface Utility Information (SUI)" to ensure quality of location and attribute data of assets and infrastructure using confidence levels, refer to Appendix 4.
- Underground pipes must not be covered before the "Work As Executed" detail is collected. Use paint marks to identify which pipes can be buried for large construction projects, such as when collecting pipe invert levels and x,y locations. For deep trench structures that are difficult to access, it may be necessary to use a reference measure such as from the crown of the pipe, or survey invert levels prior to construction of chamber walls then calculate final levels.
- Installation of trace wires is required for all non-metallic services.
- Provide survey attribute data to the requirements of Appendix D – Survey Data Requirements and include coordinate tables in drawings for newly constructed manholes, sumps, hydrants, valves, meters, sprinkler points, trees etc.
- Use the "Drawing Menu" that defines linestyles, colours and attributes (see Appendix 5) to identify all services shown. Provide a legend of all services and symbols.
- If a CCTV inspection was carried out, provide a digital video file and reference to drawing using maintenance hole reference points as an example, and advise of any defects to Campus Estate.

9. BIM Standard Requirements

UC has identified specific Building Information Modelling (BIM) requirements to meet Campus Estate expectations for projects of various sizes and delivery under various contractual obligations and methodologies.

9.1 BIM Project Delivery

BIM requires cooperation and involvement of all parties, specifically from the University, the main contractor and subcontractors to participate throughout the process, regardless of the delivery method used on a project.

The project will adopt the NATSPEC National BIM Guide and University Campus Estate procedures and requirements to implement BIM on a project.

During project start-up the University in coordination with the main contractor will setup a project brief using the NATSPEC National BIM Guide and Project BIM Brief Template (Version 2.0). The Project BIM Brief is a high-level document intended to be used early in the project when BIM is first considered, primarily for recording the University's requirements regarding the application of BIM.
Campus Estate will supply the following documents:

- Campus Architectural Planning Series (CAPS) plans, in AutoCAD drawing (DWG) format and existing Revit (RVT) files, if any
- Initial design drawings and associated documentation
- Historical drawings or documents that assist with detailed design
- Asset registers, or access to the iVivaCloud Asset CMMS

The contractor in coordination with the project team members is to complete a BIM Execution Plan or BIM Management Plan using the NATSPEC BIM Management Plan Template (Version 2.0). The BIM Management Plan is a formal document that defines how a project will be executed, monitored and controlled with regard to BIM. One of its main purposes is to make clear what members of the project team can expect from each other – who is meant to do what, and how, and when.

The project team will deliver the BIM requirements to the BIM Management Plan and the contractual agreement during the design and construction project delivery stages. The minimum requirements for BIM include the following:

- Three-dimensional (3D) model of the building/level, upgrade of CAPS plans to 3D
    - Level of Development (LOD) to LOD 300
    - Building information to meet the Construction-Operations Building Information Exchange (COBie) requirements
- The use of model or point cloud technology to depict using 3D laser scanning is recommended for all interiors, including wall and glazing partitions, windows, doors, furniture, and internal pipework
- Interaction with sensor-driven information and mobile devices.
- Integration with existing UC IT software, including:
    - The use of UC's Document Management System (DMS) and the use of drawing registers or transmittals, and linking asset documentation to the building model asset using URL's. The university currently uses SharePoint to manage its documentation.
- Computerised Maintenance Management System (CMMS), known as iVivaCloud, and use of asset registers for management of all building assets
- Building Management System (BMS), in Aurora Optergy that manages all building automation systems, including but limited to alarms, air conditioning/heating, mechanical ventilation systems.

Should there be any variations to the design and construction of the project, the BIM Management Plan should be updated to reflect this.

All building modelling and facility information developed during the design and construction of the project shall be timely and efficiently developed, maintained and exchanged from initiation of the project through to practical completion and handover in accordance with the contractual obligations and the Univerity's operational and maintenance needs.

At the conclusion of the project, lessons learnt will undertaken by the University and applied based on the NATSPEC BIM Value Tool.

9.2 Project Templates

UC shall provide a setup file as part of the contract or works to standardise BIM model construction. This setup file involves a Revit template (RTE) file that includes:

- Revit project file (RVT)
- Text styles
- Object naming conventions
- Object attribute parameters

The asset register as detailed in Section 11.5 below is to be used as a basis for development of the COBie requirements.

9.2.1 BIM Model Development Methodology

Models may be created and developed using a stage process that is suitable to support the required outcomes.

UC suggests the adoption of the NATSPEC National BIM Guide and Project BIM Brief Template* that defines the procedures and requirements to implement BIM on a project.

The level of development (LOD) as defined in the NATSPEC National BIM Guide of the BIM model shall be defined in a project specific BIM Management Plan (BMP) or contractual agreement.

* Source: http://bim.natspec.org/documents/natspec-national-bim-guide

9.2.2 BIM Model Exchange and Ownership

Due to the complexity and specialisation in BIM models, UC requests a model exchange between project team members at the "As-Built or Work As Executed" stage dependant on project design requirements.

Ownership of the models shall be defined in the BMP/contractual agreement. It is intended that the BIM model will become the intellectual property of the University of Canberra.

Minimum requirement for BIM models provided to UC are to be 3D model standard, with a view to be provided with 4D and 5D BIM subject to proprietary information contained within these models.

10. Operations and Maintenance Manuals

Operations and maintenance (O&M) manuals shall be submitted for all assets including design and construction projects, services installations and building elements with specific maintenance requirements.

10.1 Operations and Maintenance Manual Templates

UC shall provide a setup file as part of the contract or works to standardise the preparation of O&M manuals and associated documents. This setup file involves a zip file that includes:

- Asset Register (Excel spreadsheet)
- O&M Manual Template (Word document)
  - Cover Sheet
  - Table of Contents (include figures and tables)
  - Document authorisation and revision control
- Section 1 – Building / Facility Specific Information
  - High level description of facility (Basis of design, operation and control)
  - High level description of process/function
  - Hazards identification
- Section 2 – Operations Manual
  - Detailed description of operations process
  - Operating Procedures
  - Process flows (include flow charts or reference to drawings)
  - Operational monitoring and control (e.g. Modes of operation, sequences, interlocks and alarms)
  - Troubleshooting Guides
  - Technical Data Sheets / Specifications

- Section 3 – Maintenance Manual
  - Maintenance Plans / Schedules
  - Asset / Component Maintenance Plans
  - Recommended Spare Parts / Spare Parts Schedule
  - Work Method Statements (including JSA, JSEA, SWMS, Safety Procedures and/or Work Instructions where available)
- Section 4 – Commissioning
  - Witness Testing and Training
  - Commissioning / Asset Handover Forms
- Section 5 – Drawings
  - Drawing List (with links to drawings saved on UC's SharePoint)
- Appendices
  - Appendix A – Project Details
  - Appendix B – List of Suppliers
- Checklist

The O&M manuals must contain these separate sections as a minimum to ensure correct operating procedures of assets, ensure specific maintenance tasks are carried out and detailed technical information is provided for further development.

10.2 Document Numbering Convention

When submitting O&M manuals and associated documentation, all documents shall be accurately identified within the project.

Document number format: [Building Number/Name]-[Level]-[Discipline]-[Identifier]

Example: MC001-A-AR-O&M01

Where the identifier is the internal project/document number or name the consultant/contractor requires.

Table 9: Document Number Convention (BU-LVL-Disc-ID)

Building Number (BU)	Level (LVL)	Discipline (Disc)	Identifier (ID)
MC001	A	AR	O&M01

Refer to Appendix 1 for Drawing/Document Numbering Convention.

10.3 Document File Naming Convention

File names of all documents shall be named according to the title of the document with the revision/version included.

Document file naming format: **[Building Number/Name] [Level] [Document Type] [Discipline]_[Rev]**

Example: **Building 1 Level A O&M Manual – Architectural_Rev1.docx**

10.4 Operations and Maintenance Manual Submission Requirements

O&M manuals and associated documents shall be submitted in accordance with document submission process as outlined in Section 1. Table 12 below also defines hardcopy documentation requirements to be phased out by 2020.

10.5 Asset Register

UC has identified specific asset management requirements to assist with operations and maintenance in accordance with the ISO 55000 series. UC's definition of assets is detailed Table 10 Asset Hierarchy and are managed within the Asset Management System, iVivaCloud. The Asset Register is a vital record that needs to be managed throughout the project lifecycle. For projects upgrading or connecting to existing buildings, facilities or assets, the Operations and Maintenance Team oandm@canberra.edu.au shall supply an existing register or template.

10.5.1 Asset Identification

The identification of assets is a two-stage process where the main contractor / consultant is to identify the asset with the description field and supply the register to the Operations and Maintenance (O&M) team. The O&M team adds the asset to iVivaCloud and updates the asset register to include an asset identifier (also known as GUID). Following this, the asset identifier needs to prudently managed and consistently applied across all documentation. For instance, the asset identifier should be detailed in switchboard schedules and QR code stickers should be attached to physical assets. The asset identifier is to be accurately detailed across all forms, including:

- Documentation and drawings (including shop drawings)
- IT systems, including the Optergy Building Management System (BMS), iVivaCloud and Project Management / Document Management Systems (such as Aconex / Procore and SharePoint)
- O&M Manuals

10.5.2 Asset Disposal or Replacement

All assets under the University's control that are identified for disposal or removal within the project or job must be detailed in the asset register. O&M team will supply an existing register upon request that should describe the asset to be disposed of. In the instance that it is not supplied or shown, it should be included as a line item within the asset register.

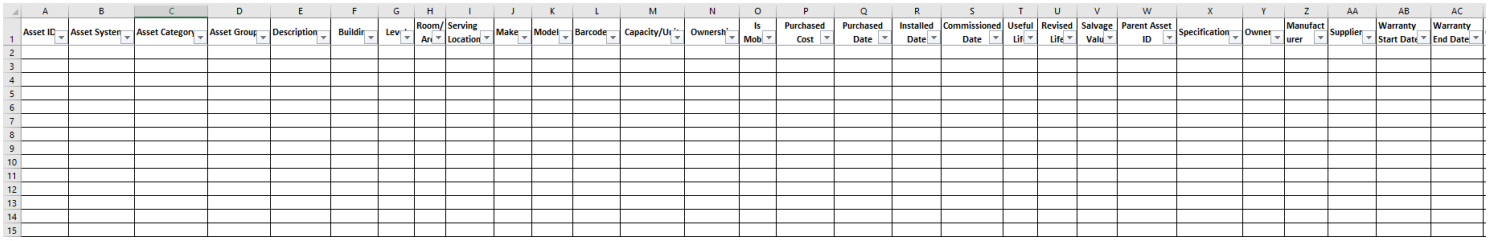

Figure 1: Asset Register Template

Table 10: Asset Hierarchy

Mechanical Services	Air Conditioning	Air Curtain		Hydraulic Services	Domestic Hot Water	Accumulator		Building Fittings & Furniture	Sanitaryware	Paper Towel Dispenser
		Air Handling Unit				Controller				Soap Dispenser
		Branch Box				Domestic Hot Water Unit				Toilet Paper Holder
		Branch Selector Box				Motor				Hand Dryer
		Condenser				Pump			Appliance	Fridge
		Damper				Radiator				Dishwasher
		DX Unit				Solar Panel				Washing Machine
		Evaporative Cooler				Tank				Stove / Cooktop
		Fan			Domestic Water Supply	Back Flow Prevention				Oven
		Fan Coil Unit				Emergency Eye Wash				Microwave
		Heat Exchanger				Safety Shower				Coffee Machine
		Heater				Thermostatic Value			Art Collection	Book
		Motor			Portable Water Supply	Drinking Fountain				Ceramic
		Packaged Unit				Hot/Cold Water Unit				Drawing
		Reheat				Water Cooler				Glass
		Split System			Sanitaryware	Toilet				Object
		Variable Air Volume Box		Electrical Services	Switchboards	Control Panel				Oil On Canvas
		Variable Speed Drive				Distribution Board				Painting
		VRF Unit				Main Switchboard				Photography
		VRV Unit				Mech Services Switchboard				Pottery
	Chilled Water System	Chiller				Sub Switchboard				Print
		Condenser				Switchboard				Sculpture
		Cooling Tower			High Voltage System	Substation				Textile
		Dosing Pump				Voltage Regulator		Building Fabric	Flooring	Carpet
		Fan			General Lighting	Internal Light				Vinyl
		Motor			Generator	Diesel Generator				Cork
		Pump		Fire Services	Fire Suppression	Damper				Timber
		Tank				Door				Rubber
		Variable Speed Drive				Extinguisher				Concrete
	Heating Hot Water System	Boiler				Blanket				Marble
		Fan				Hose & Reel				Ceramic
		Heat Exchanger				Motor			Ceiling	Tile
		Heater				Pump				Plasterboard
		Motor			Automatic Fire Alarm System	Fire Indicator Panel				Timber
		Pump		Civil & Site	Roads	Road			Stairs & Ramps	Stairwell
		Tank			Paths	Bicycle Path				Ladder
		Variable Speed Drive				Footpath				Ramp

Mechanical Services	Heating Hot Water System	Tank		Civil & Site	Car Parks	Multi-Storey		Building Fabric	Stairs & Ramps	Ladder
						Rooftop				
						Open-Air				
	Ventilation & Exhaust	Fan		Civil & Site		Multi-Storey		Building Fabric	Windows	Auto Window Window Fixed Window
Vertical Transportation	Elevators & Lifts	Disabled Lift		Security	Access Control	Boom Gated				
		Dumbwaiter Lift				Cardax Reader				
		Goods Lift				Salto Reader				
		Passenger Lift				Salto Online Reader				
		Scissor Lift			Surveillance	CCTV Camera				
						CCTV Camera Server				

Table 11: Hardcopy / Softcopy Documentation Submission

Project Type	Hardcopy Qty.	Submission Stage	% Complete	Softcopy Qty.	Submission Stage	% Complete
Existing Refurbishment	1	Asset Register	30	1	Asset Register	30
	1	O&M Manual handover at Date of practical completion	90	1	O&M Manual handover at Date of practical completion	90
	1	All documentation handover (including final O&M Manual) Four (4) weeks after practical completion	100	1	All documentation handover (including final O&M Manual) Four (4) weeks after practical completion	100
	1	All documentation handover (including final O&M Manual) Defects liability period	100	1	All documentation handover (including final O&M Manual) Defects liability period	100
New Build Projects	1	Asset Register	30	1	Asset Register	30
	1	O&M Manual handover at Date of practical completion	90	1	O&M Manual handover at Date of practical completion	90
	1	All documentation handover (including final O&M Manual) Four (4) weeks after practical completion	100	1	All documentation handover (including final O&M Manual) Four (4) weeks after practical completion	100
	1	All documentation handover (including final O&M Manual) Defects liability period	100	1	All documentation handover (including final O&M Manual) Defects liability period	100

11. Technical Reports, Specifications, Certificates and Warranties

Detailed technical reports, specifications, certificates and warranties shall be submitted depending on the asset or service provided. A manufacturer or suitably qualified consultant/contractor may provide technical information that can be used for:

- Operations and maintenance (to be incorporated into O&M manuals)
- Master planning
- Asset condition assessments

- Compliance
- Where possible use cross references to existing documentation provided, in particular to drawings, and reference to asset identification/numbering conventions as described in Section 3.3.

11.1 Document Templates

It is acceptable to use manufacturer's or consultant's / contractor's templates. If preparing or updating a corporate report, it is preferred that the document provided is used or at least used as a reference. Existing documents can be requested under RFI (Request for Information) or Technical Query (TQ) to ProjectDeliveryTeam@canberra.edu.au or the relevant UC Project Manager/requestor.

11.2 Technical Specifications

Technical specifications shall contain the following information:

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

11.3 Certificates

Certification shall contain the following information for each system installed or service provided:

- Certificates and registrations from authorities
- Product certification
- Service provision, e.g. Removal of Asbestos
- Commissioning test results
- Commissioning test reports
- Safety Data Sheets

11.4 Warranties

Manufacturers' warranties shall be provided as part of the O&M manuals for all systems and any services with provision to risk and/or safety.

12. Commissioning and Handover of Documentation

To be advised at a later date, proposed documents include:

- Practical Completion Certificate
- Project Handover Deliverables Checklist

REFERENCE STANDARDS OR RELEVANT DOCUMENTS

ACT Digital Strategy https://www.cmtedd.act.gov.au/__data/assets/pdf_file/0019/1502254/ACT-Digital-Strategy.pdf

Australasian BIM Advisory Board (ABAB) Asset Information Requirements Guide

Adopting Geocentric Datum of Australia 2020 (GDA2020)
https://www.planning.act.gov.au/tools_resources/survey-spatial-data-maps/adopting-geocentric-datum-of-australia-2020

Land Titles Act 1925 http://www.legislation.act.gov.au/a/1925-1/current/pdf/1925-1.pdf

Land Titles Practice Manual (ACT), December 2019
https://www.accesscanberra.act.gov.au/ci/fattach/get/377554/1578286520/redirect/1/filename/201912+-+Land+titles+practice+manual.pdf

Lunr Common Data Environment Procedures https://onset.zendesk.com/hc/en-au/categories/360000133156-Lunr

NATSPEC National BIM Guide https://www.bim.natspec.org/documents/natspec-national-bim-guide

Technical Information Paper - Methods of Measurement, Australian Property Institute (API)

University of Canberra Standards, Policies and Procedures (Contact UC for latest revision)

- BMS Specification
- Brand Guidelines
- Campus Master Plan
- *Design Standards (Under development)*
- DITM Audio Visual Specification for Bookable Teaching Spaces
- DITM Audio Visual Specification for Computer Laboratories
- DITM Network Specification – Category 6 & Optical Fibre Structured Cabling System
- Outdoor Lighting Guidelines
- Security IP CCTV Specification
- Security System Installation Specifications
- Signage Standards and Design Manual
- Space Management Policy

GLOSSARY

AHD	Australian Height Datum
As-Built	Description of a document, drawing or model that records the details of construction work of built assets or structures following its completion. May be used in conjunction with *As-Constructed* or *Work As Executed*.
Asset Identifier	An identifier given to an asset that guarantees its uniqueness throughout its entire life. Also known as *GUID (Global Unique Identifier)* or *Asset Number*.
BIM	Building Information Modelling: Digital form of construction and asset operations. It brings together technology, process improvements and digital information to improve client and project outcomes and asset operations.
BMS (or IVELTS)	Building Management System (or Integrated Extra Low Voltage System). Building automation system used for efficient operation of building systems, plant, and occupant comfort.
CAD	Computer-Aided Design: A geometric / symbol-based computer drawing system that replicates hand drawing techniques.
CAFM	Computer-Aided Facilities Management: The use of software applications to support facilities management.
CDE	Common Data Environment: A single source of information for any given project, used to collect, manage and disseminate all relevant approved project documents for multi-disciplinary teams in a managed process. [Source: ISO 19650-1]
COBie	Construction Operations Building Information Exchange: An information exchange specification for lifecycle capture and asset information needed by facility managers. It identifies the content of the information that must be captured and exchanged at each phase of the project.
DITM	Digital Information Technology Management: ICT business unit
EWIS	Emergency Warning and Intercommunication System
GDA2020	Geocentric Datum of Australia 2020 coordinate system with the projection for the ACT as the Map Grid of Australia 2020 (Zone 55).
GIS	Geographic Information System: A system that integrates hardware, software and data for capturing, managing, analysing and displaying all forms of geographically referenced information.
Handover	Process for completing the design and construction of an asset, including asset information, and transferring responsibility or ownership of the information to another party or client. Key handover documents should be contractually identified or detailed in this standard.
HVAC	Heating, Ventilation and Air-Conditioning systems and auxiliary equipment.
ICT	Information and communications technology
IFC	Industry Foundation Class: A data model standard for defining and representing standard architectural and construction-related graphical and non-graphical data as 3D virtual objects to allow data exchange between software applications.
Information	Reinterpretable representation of data in a formulised manner, suitable for communication, interpretation or processing. [Source: IEC 82045.1:2001, 3.1.4]

Link or Hyperlink	On-screen hyperlink displayed as a designation, code, icon or similar that, when clicked on, takes the reader directly to the file's location, or opens it.
Lunr	Refers to UC's Common Data Environment (CDE), in which all contractors and consultants may request access to the drawings and document management system.
Metadata	Data describing the content (including indexing terms for retrieval), context and structure of electronic document-based information and its management over time. [Source: ISO/TR 18492:2005]
O&M	Operations and Maintenance
SAMP	Strategic Asset Management Plan: Documented information that specifies how the University's strategic or operational objectives are to be converted into asset management objectives, for the approach of developing asset management plans. [Source: ISO 55000:2014]
Structured Information	Information assembled from predefined concepts (vocabulary or code set) using an organisation scheme, or information model. [Source: ISO/TS 17251:2016]

Appendix A – Drawing and Document Numbering Convention

Drawing/Document Number = MCBU-LVL-Disc-ID

Building Number (BU)		Level (LVL)		Discipline (Disc)		Project / Drawing Number (ID)
MC	Main Campus	A	Level A	AR	Architectural	
MC001	Building 1 (Chancellery)	B	Level B	CV	Civil	
MC002	Building 2	C	Level C	EL	Electrical	
MC003	Building 3	D	Level D	FP	Fire Protection	
MC004	Building 4 (Gym)	E	Level E	GA	Gas	
MC004a	Building 4a (Sports Amenities)	X	Multiple Areas	GN	General	
MC005	Building 5			HY	Hydraulic	
MC006	Building 6			LA	Landscaping	
MC007	Building 7			ME	Mechanical	
MC008	Building 8 (Library)			SC	Security	
MC009	Building 9			SU	Survey	
MC010	Building 10			ST	Structural	
MC011	Building 11			TF	Parking & Traffic	
MC012	Building 12					
MC013	Building 13					
MC013a	Building 13a					
MC013b	Building 13b					
MC013c	Building 13c					
MC014	Building 14 (Boiler House)					
MC015	Building 15					
MC016a	Building 16a					
MC016b	Building 16b					
MC016c	Building 16c (Bulk Store)					
MC016d	Building 16d					
MC017	Building 17					
MC018	Building 18					
MC019	Building 19					
MC020	Building 20					
MC022	Building 22 (Innovation Centre)					
MC023	Building 23 (Innovation Centre)					
MC024	Building 24 (Conference Centre)					
MC025	Building 25 (Inspire Centre)					
MC027	Building 27 (Laboratory)					
MC028	Building 28 (Health Hub)					
MC029	Building 29 (Sports Hub)					
CCKI	Kirinari Early Childhood Centre					
CSMC	Canberra Specialist Medical Centre					

Building Number (BU)		Level (LVL)	Discipline (Disc)	Project / Drawing Number (ID)
RE	**Residential**			
REBGA	Bega Student Accommodation			
REBIM	Bimbimbie (VC Residence)			
REBU	Buru (Residential Blocks A-H)			
RECAH	Cooinda Hu			
RECL	Cooper Lodge			
RECMA	Cooma Student Accommodation			
REDY	Dyara (Student Villages)			
REEDN	Eden Student Accommodation			
REGB	Gurubun (International House)			
REGG	Guginya (Campus Living Villages)			
REMUL	Mulleum (College House)			
REMYA	Moruya Student Accommodation			
RENMA	Narooma Student Accommodation			
REUCL	UC Lodge			
REWG	Wagan (Residential Blocks I-N)			
RWLN	Weeden Lodge North			
RWLS	Weeden Lodge South			
TF	**Training Facilities**			
TFBGA	Bega Clinical Training Facility			
TFCMA	Cooma Clinical Training Facility			
TFMYA	Moruya Clinical Training Facility			
UCH	UC Hospital			

Appendix B – Drafting Standards

Colour Standards

The standard primary colours to be used in the preparation of layers within UC's CAD drawings:

Primary Colour Standards

Layer Colour	Number (AutoCAD)	Lineweight	Pen Colour	Pen Number
Red	1	0.35mm	Black	7
Yellow	2	1.00mm	Black	7
Green	3	0.50mm	Black	7
Cyan	4	0.70mm	Black	7
Blue	5	0.15mm	Black	7
Magenta	6	0.18mm	Black	7
White	7	0.25mm	Black	7
Dark Grey	8	0.13mm	Black	7
Light Grey	9	0.09mm	Black	7

Layer Standards

The standard layer name convention shown below shall be used in the preparation of UC's CAD drawings.

Campus Architectural Planning Series (CAPS) Layer Standards

Layer Name	Pen Number or RGB Colour	Linetype	Lineweight	Plot
Accessibility	8	Continuous	0.13mm	True
Columns	10	Continuous	0.18mm	True
Dimensions	9	Continuous	0.09mm	True
Doors	8	Continuous	0.13mm	True
Floors				
Above	252	Hidden	0.09mm	True
Below	252	Dashed	0.09mm	True
Furniture	252	Continuous	0.09mm	True
Joinery	252	Continuous	0.09mm	True
Sanitary	252	Continuous	0.09mm	True
Services				
Communications	RGB (255,190,0)	Communications_Line	0.15mm	True
Electrical	RGB (255,255,0)	Electrical_Line	0.15mm	True
Fire	RGB (255,65,0)	FireServices_Line	0.15mm	True
Hydraulic (Plumbing)	RGB (0,190,255)	Hydraulic_Line	0.15mm	True
Mechanical	RGB (255, 125, 190)	MechanicalServices_Line	0.15mm	True
Sewerage	RGB (255,0,0)	Sewer_Line	0.15mm	True
Stormwater Drainage	RGB (0,125,0)	Stormwater_Line	0.15mm	True
Stairs_Ramps_Lifts	8	Continuous	0.13mm	True
Text				
Text – Primary	160	Continuous	0.09mm	True
Text – Secondary	9	Continuous	0.09mm	True

Layer Name	Pen Number or RGB Colour	Linetype	Lineweight	Plot
Walls				
External	White – 7	Continuous	0.25mm	True
Internal	White – 7	Continuous	0.25mm	True
Windows	10	Continuous	0.18mm	True

Space Inventory Layer Standards

Layer Name	Description	Colour	Linetype	Lineweight	Plot
SpaceManagement_Gros	Total Gross Floor Area of Level	Red – 1	Continuous	0.35mm	False
SpaceManagement_Room	Gross Floor Area of Room	Blue – 5	Continuous	0.15mm	False
SpaceManagement_Tenant	Gross Floor Area of Tenancy	White – 7	Continuous	0.25mm	False

Campus Site Plans

Layer Name	Colour	Linetype	Lineweight
Boundary (BDY)			
Sublease		Continuous	
Title		Boundary_Line	
Unit		Unit	
Buildings (BLDG)			
Major		Continuous	
Minor		Continuous	
Civil (CIV)			
Driveway		Continuous	
Retaining Wall		Continuous	
Communications (COM)			
AAPT			
Fibre Optic		FibreOptic_Line	
iiNet		Communications_Line	
Line		Communications_Line	
NBN		Communications_Line	
Nextgen		Communications_Line	
Optus		Communications_Line	
PMG		Communications_Line	
Pit		Continuous	
Telstra		Telecommuications_Line	
Dimensions		Continuous	

Layer Name	Colour	Linetype	Lineweight
Electricity (EL)			
Fuse Box		Continuous	
Line / Cabling		LV_Electrical_Line	
		HV_Electrical_Line	
Maintenance Hole		Continuous	
Meter		Continuous	
Mini Pillar		Continuous	
Pit		Continuous	
Pole		Continuous	
Streetlight		Continuous	
Substation		Continuous	
Transformer		Continuous	
Footpaths (FP)		Continuous	
Furniture (FUR)			
BBQ		Continuous	
Bicycle Rack		Continuous	
Piano		Continuous	
Seat		Continuous	
Gas (GAS)			
Marker		Continuous	
Meter		Continuous	
Pipe		Gas_Line	
Pit		Continuous	
Valve		Continuous	
Landscaping (LA)			
Garden Edge		Continuous	
Paved Edge		Continuous	
Miscellaneous (MISC)			
Bollards		Continuous	
Boom Gates		Continuous	
Cameras (CCTV)		Continuous	
Caravan		Continuous	
Fences		Fence_Line	
Flag Pole		Continuous	
Fire Hose Reel		Continuous	
Gate		Continuous	
Litter Bin		Continuous	
Log Barriers		Continuous	
Playground		Continuous	
Post Box		Continuous	
Sculpture		Continuous	
Signage		Continuous	
Stockpile		Dotted	
Roads (RD)			
Furniture – Barriers		Continuous	
Kerb – Back		Continuous	
Kerb – Lip		Continuous	
Kerb – Top		Continuous	
Lines		Continuous	
Paved Area – Bitumen		Continuous	
Paved Area – Concrete		Continuous	
Paved Area – Gravel		Continuous	
Pedestrian Crossing		Continuous	
Speed Hump		Continuous	

Layer Name	Colour	Linetype	Lineweight
Sewer (SEW)			
Grease Trap		Continuous	
Inspection Opening		Continuous	
Maintenance Hole		Continuous	
Pipe		Sewer_Line	
Pit		Continuous	
Vent		Continuous	
Stormwater (STW)			
Culvert		Continuous	
Grated Pit		Continuous	
Grease Trap		Continuous	
Headwall		Continuous	
Inspection Opening		Continuous	
Maintenance Hole		Continuous	
Pipe		Stormwater_Line	
Pit		Continuous	
Subsoil Drain		Subsoil_Drain	
Sump		Continuous	
Vent		Continuous	
Survey (SU)			
Borehole		Continuous	
Control		Continuous	
Grid		Continuous	
North Point		Continuous	
Text			
Primary		Continuous	
Secondary		Continuous	
Vegetation (VE)			
Shrubs		Continuous	
Trees		Continuous	
Water (WAT)		Continuous	
Grease Trap		Continuous	
Inspection Opening		Irrigation_Line	
Irrigation		Continuous	
Maintenance Hole		Water_Line	
Pipe		Continuous	
Pit		Continuous	
Vent			

Appendix C – Survey Tolerances

Project Stage	Asset	AS 5488 Quality Level	X/Y Tolerance	Z Tolerance
Design	Proposed underground utilities (X/Y location, invert levels)	A	±50mm	±50mm
Design	Existing underground utilities (Pipe locator)	B/C	±300mm	±50mm
Design	Existing underground utilities (Hydrovac, Pothole)	A	±50mm	±50mm
Design	Pits (X/Y location, invert levels)	B	±300mm	±500mm
Design	Above ground assets (X/Y location, cover levels)	A	±50mm	±50mm
Construction	New underground utilities (X/Y location, invert levels)	A+	±50mm	±10mm
Construction	Existing underground utilities (Hydrovac, pothole)	A	±50mm	±50mm
Construction	Pits (X/Y location, invert levels)	A	±50mm	±50mm
Construction	Above ground assets (X/Y location, cover levels)	A+	±50mm	±10mm

Appendix D – Survey Data Requirements

Attribute	Description	Metadata	Mandatory
AssetID	Used as an identifier to describe the asset (to be used to reference to the BMS/Works Management System)	A	No (UC to complete)
ConstructionDate/ CommissioningDate/ ConstructionYear	Used to identify the date of construction or age of asset.		Yes
DataSource	The data source used to identify the asset.	As-Built / Work As Executed Drawing Survey (if no Work As Executed Drawing) Design Drawing Existing Drawing Field Check Unknown	Yes
DrawingNumber	The drawing number, job number or identification used to reference the data source.		Yes
Owner	Owner of a particular asset	University of Canberra ACT Government ActewAGL Icon Water iiNet Telstra Private	Yes
LifecycleStatus	The functional, operational or existential status of the asset at the time the drawing/ survey is submitted.	Active Abandoned Designed/Planned Removed	Yes
PositionSource	The spatial accuracy, position or location of the asset.	As-Built / Work As Executed Drawing DGPS Assumed	Yes
Easting*	Survey Easting Coordinate Position (ACTGRID or GDA 2020)		Yes
Northing*	Survey Northing Coordinate Position (ACTGRID or GDA 2020)		Yes

*Point features only

Appendix E – GIS Data Requirements

Feature Class (Asset Name / Layer)		Description	Metadata	Mandatory
Buildings	BuildingNumber	Building Number	Drop down list	Y
	BuildingName	Building	Drop down list	Y
	Levels	Number of Levels		Y
	ConstructionYear	Year Building Constructed		Y
	SpaceType	Space Type	Building	Y
	AreaType	Area Type (GBA, GFA or UFA)	Drop down list	Y
	Area	Area	Calculated	Y
ConstructionZone	ConstructionStartDate	Construction Start Date		Y
	ConstructionFinishDate	Construction Finish Date		
Parking	ParkingNumber	Parking Number, e.g. P1		N
	ParkingName	Parking Name		N
	ParkingType	Parking Type		Y
	ParkingSpaces	Number of Spaces		Y
Landuse	Neighbourhood	Campus Master Plan	Bimbimbie	Y
			Campus	
			Community	
			Concourse	
			Health Precinct	
			Heartland	
			Innovation Park	
			Sporting Commons	
			University Green	
			University Hill	
			Village	
Gas				
Meter	MeterNumber	Meter Number		Y
	Manufacturer	Manufacturer		Y
	Model	Model Name/Number		Y
	Size	Meter Size		Y
Valve	SubType	Type of Valve		Y
	Operation	Operation	Automatic	Y
			Manual	Y
	Size	Valve Size		
Main	SubType	Type of Main		Y
	Material	Pipe Material		Y
	Diameter	Pipe Diameter		Y
	InvertLevel1	Survey Invert Level (AHD in metres) at highest end of pipe		Y
	InvertLevel2	Survey Invert Level (AHD in metres) at lowest end of pipe		Y

Feature Class (Asset Name / Layer)		Description	Metadata	Mandatory
Sewer				
MaintenanceHole	LidMaterial	Maintenance Hole Lid / Cover Material		Y
	LidClass	Maintenance Hole Lid / Cover Class		N
	AccessType	Maintenance Hole Chamber Access Type		Y
	AccessDiameter	Maintenance Hole Chamber Access Diameter		Y
	WallMaterial	Maintenance Hole Chamber Wall Material		Y
	Construction	Maintenance Hole Construction		Y
	CoverLevel	Maintenance Hole Lid/ Cover Surveyed Level (AHD in metres)		Y
Sump	LidMaterial	Sump Lid/Cover Material		
ServicePoint	CustomerType	CustomerType		
Tee	Size	Size of Tee Connection Tee		
	Material	Connection Material		
Pipe	Material	Pipe Material		
	Diameter	Pipe Nominal Diameter		
	ExteriorProtection	Exterior Lining Protection Material		
	LiningType	Interior Lining Material		
	PipeClass	Pipe Class		
	JointType	Pipe Joint		
	InvertLevel1	Survey Invert Level (AHD in metres) at highest end of pipe		
	InvertLevel2	Survey Invert Level (AHD in metres) at lowest end of pipe		
Water				
Hydrant	SubType	Type of Hydrant		
	Manufacturer	Manufacturer		
	Model	Model Name/Number		
Meter	MeterNumber	Meter Number		
	Manufacturer	Manufacturer		
	Model	Model Name/Number		
	Size	Size		
Tee	Size	Size of Tee Connection		
	Material	Material		
Valve	SubType	Type of Valve		
	Size	Size of Valve (mm)		
	Material	Material		
ReticulationMain	Material	Pipe Material		
	Diameter	Pipe Nominal Diameter		
	ExteriorProtection	Exterior Lining Protection Material		
	LiningType	Interior Lining Material		
	PipeClass	Pipe Class		
	JointType	Pipe Joint		
	InvertLevel1	Survey Invert Level (AHD in metres) at highest end of pipe		
	InvertLevel2	Survey Invert Level (AHD in metres) at lowest end of pipe		

Feature Class (Asset Name / Layer)		Description	Metadata	Mandatory
Irrigation				
Control	SubType	Irrigation Control Box/PointType		
	Manufacturer	Manufacturer of Irrigation Control Box/Point Type		
	Model	Model Number		
	PressureLimit	Pressure Limit (kPa)		
Sprinkler	SubType	Sprinkler Type		
	Manufacturer	Sprinkler Manufacturer		
	Model	Sprinkler Model		
	Size	Size of Sprinkler (mm)		
Tap	SubType	Type of Tap		
	Manufacturer	Tap Manufacturer		
	Model	Model of Tap		
	Size	Size of Tap (mm)		
Tee	Size	Size of Tee Connection		
	Material	Material		
Valve	SubType	Type of Valve		
	Size	Size of Valve (mm)		
	Material	Material		
Pipe	SubType	Type of Pipe		
	Material	Pipe Material		
	Diameter	Pipe Diameter		
	PipeClass	Pipe Class		
	JointType	Pipe Joint		
	InvertLevel1	Survey Invert Level (AHD in metres) at highest end of pipe		
	InvertLevel2	Survey Invert Level (AHD in metres) at lowest end of pipe		
Landbase				
Block	District	ACT District	Belconnen District	
	Division	ACT Division or Suburb	Bruce	
	Section_Nu	Section Number	9	
	Block_Num	Block Number	3	
	ACTMAPKey	ACTMAP Key (Division, Section, Block)		
	Section_Bl			
	St_Num	Street Number		
	St_Name	Street Name	Aikman Drive Allawoona Street Bimbimbie Street Broula Street College Street Cooinda Street Ginninderra Drive Guruguma Street Haydon Drive Kirinari Street Pantowora Street Pinaroo Street Telita Street Thirriwirri Street University Drive North University Drive South	

Feature Class (Asset Name / Layer)		Description	Metadata	Mandatory
Landbase				
Block	Address Life_Stg DivSecBlck	Address (Street Number & Street Name)		
Easements	EasementType			
Kerb	Kerb			
Path	Path			
Waterways	Water_Body Water_Name			