



THE UNIVERSITY OF
AUCKLAND
Te Whare Wānanga o Tāmaki Makaurau
NEW ZEALAND

Property Services Design Standards and Guidelines

Section **19** **Asset Management Information Requirements**

Version 2.0



Document Control Information

Team Name:	Design Standards Steering Group	Published date:	27 June 2022
Document version:	2.0	Revision date:	Annually

Document Control

Version	Review Date	Authorised by	Description
1.0	29 October 2019	Design Standards Steering Group	Initial version of manual.
2.0	27 June 2022	Design Standards Steering Group	Update on 19.1.3, 19.3.3, 19.5.1, 19.5.2, Appendix B, C, D J, K, M, and typographic correction.

Feedback

If you spot an error in this document, or you have a suggestion on how we can improve the document, please tell us about it by printing, completing and emailing the form in Appendix A to us at PTechServices@auckland.ac.nz.

19 Asset Management Information Requirements

Table of Contents

19.1	Introduction.....	5
19.1.1	Purpose	5
19.1.2	Asset Management Systems.....	5
19.1.3	Summary of Project Related Asset Management Documentation	6
19.2	Abbreviations and Definitions	7
19.3	Project Drawing and Documentation.....	8
19.3.1	Set-up Meeting	8
19.3.2	As-built Matrix.....	8
19.3.3	As-built Drawings	9
	As-built Drawing Submission Process.....	9
	As-built Drawing Requirements.....	10
	As-built Drawings Model	10
19.3.4	Operation & Maintenance Manuals	10
19.4	Asset Registration Process.....	12
19.4.1	Equipment Reference Numbers in Maximo	12
19.4.2	Asset Label Workflow	12
19.4.3	Asset Registration Form.....	12
19.5	Building Information Modelling (BIM)	13
19.5.1	BIM Requirements	13
19.5.2	Client Specific Requirements	13
19.5.3	BIM Use Competency Requirements	13
19.6	Consents and Certificates	15
Appendix A	Feedback Form	16
Appendix B	Example of As-built Matrix.....	17
Appendix C	As-built Drawing Requirements	18
Appendix D	O&M Manual and Construction Record Handover Sign Off Checklist.....	21
Appendix E	O&M Manual Content	22
Appendix F	O&M Guidelines	26
Appendix G	Asset Label Assignment Process	28
Appendix H	Asset Label Process Timeline	29
Appendix I	Instructions for Completing Asset Form	30
Appendix J	New Asset Label Registration Form	31
Appendix K	Existing Asset Form	31
Appendix L	BIM Workflow	32
Appendix M	BIM Requirements	33
Appendix N	Index	36

List of Tables

Table 1: University of Auckland asset information systems.....	5
Table 2: Summary of asset management documentation.....	6
Table 3: Asset management information requirement abbreviations	7
Table 4: Information related with services equipment	13
Table 5: BIM use competency requirements	14
Table 6: Compliance certification	15
Table 7: Trade details for drawing numbering	18
Table 8: Electronic O&M manual production milestones	27

List of Figures

Figure 1: As-built drawing submission process	9
Figure 2: Format of O&M cover page	22
Figure 3: Asset label process flow	29

19.1 Introduction

Introduction

This section provides details of the University of Auckland’s administrative and procedural requirements related to asset management.

This section shall be specifically read in conjunction with *Section 1 About this Document* and *Section 2 Project and Building Works Requirements* of the University of Auckland’s Property Services Design Standards and Guidelines.

This section is intended to be read and implemented during the design stage and cross references with *Section 24 Project Handover Documentation*.

19.1.1 Purpose

The purpose of this section of the Property Services Design Standards and Guidelines is to define the minimum standards for asset management related documentation prepared by contractors and submitted to the University and Property Services (PS) under contractual obligations for delivery of capital works, minor works and other related services.

The types of information that this section relates to includes all project related asset management documentation namely As-built drawings, Operations and Maintenance (O & M) Manuals, Asset registration, BIM models and compliance certificates.

In this document the requirements for the project related information are outlined to obtain a high-quality uniform set of documents that can be made easily available for future reference.

19.1.2 Asset Management Systems

It is important that all documentation and drawings are compatible with the University’s requirements.

Table 1 shows the relationship between the different systems, software and documentation used at the University to record asset information.

Table 1: University of Auckland asset information systems

System	Related Software	Documentation
BIM	REVIT	BIM Models
Building asset management system	Maximo	Asset Registration Form
Drawing management system	DvTDM	Drawings in PDF & DWG format
Space information system	Insite	Maps
Records management system	R Drive/ DvTDM	Project related documents

19.1.3 Summary of Project Related Asset Management Documentation

Table 2 summarises documentation requirements in relation to the overall asset management process. This documentation standard sets out the minimum requirements for a project but is not limited to these documents.

Table 2: Summary of asset management documentation

Document Name	Project Stage		Importance of the document	Reference in this document to detailed procedure
	Document Initiation	Final Handover		
As-built Matrix	Procurement stage	At PC	<ul style="list-style-type: none"> Prepare for a smooth transition Provide understanding of what paperwork needs to be handed over 	Section 19.3.2
As-built drawings	Concept/ Preliminary Design stage	At PC – Draft Within 3-6 months after PC – Final	<ul style="list-style-type: none"> Future renovation project references Operational references Maintenance purposes Provides information for safety and hazard issues. 	Section 19.3.3
O & M Manuals	Construction stage	At PC – Draft Within 3-6 months after PC - Final	<ul style="list-style-type: none"> Safe and efficient operation Refer to any warranties 	Section 19.3.4
Asset Registration form	Concept/ Preliminary Design stage	Updates at various stages Final Submission prior to PC	<ul style="list-style-type: none"> Set up preventive maintenance schedule Assist in estimating the future capital investment in fixed assets 	Section 19.4.3
BIM Models	Concept/ Preliminary Design stage	At PC – Draft Within 3-6 months after PC - Final	<ul style="list-style-type: none"> Future renovation projects references Operational references Maintenance purposes 	Section 19.5
Consents and Certificates	Design Stage	At PC – Consent Within 3-6 months after PC – All other documents	<ul style="list-style-type: none"> BWOF management Legislative requirement Warranty management 	Section 19.6

19.2 Abbreviations and Definitions

Asset Management Information Requirements abbreviations

Table 3: Asset management information requirement abbreviations

Abbreviation	Description
AM	Asset Management
BD	Building Distributor
FD	Floor Distributor
BIM	Building Information Modelling
BMS	Building Management System
BWOF	Building Warrant of Fitness
CDE	Common Data Environment
DB	Distribution Board
FM	Facilities Management
MSB	Main Switch Board
O&M	Operations and Maintenance
P&G	Preliminary and General
PC	Practical Completion
PCBU	Person Conducting Business Unit
PM	Project Manager
PS	Property Services

19.3 Project Drawing and Documentation

19.3.1 Set-up Meeting

It's important that a start-up meeting is held for each project to discuss asset management related information methodology. The meeting must be attended by the consultants, the University's Project Manager (PM), and the University's Asset Team. The PM should arrange this meeting in a room with appropriate video screen.

19.3.2 As-built Matrix

The PM shall coordinate with the consultants to complete the As-built Matrix (Appendix B). This defines the As-built and O&M manual information that's required on a project specific basis. The PM shall include this matrix in the Preliminary & General (P & G) contract.

At this stage, the PM hands the agreed matrix to the asset team.

19.3.3 As-built Drawings

As-built Drawing Submission Process

Figure 1 describes the procedure and roles/responsibilities for including project As-built drawings and documentation into the University’s document management system. Prior to final As-built drawing handover to the University each consultant shall sign off the O&M manual and construction record handover sign off checklist (Appendix D).

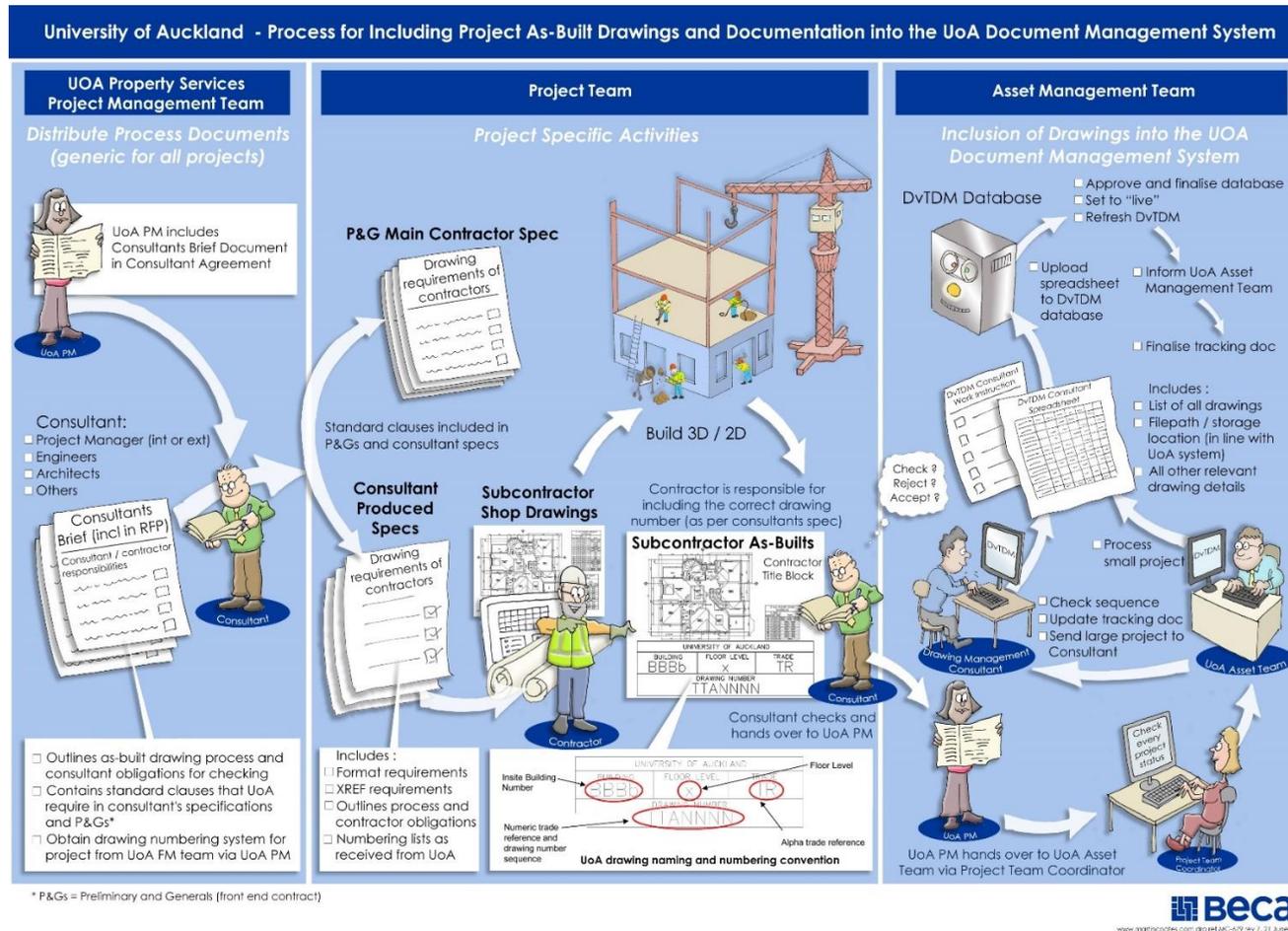


Figure 1: As-built drawing submission process

As-built Drawing Requirements

Consultants shall obtain the project specific drawing numbering sequence from the University's asset team via the PM. The As-built drawing standard is shown in Appendix C . Consultants shall include this information in the P&G contract and all trade specifications where it is the contractor's responsibility to complete as-built drawings.

Note: The highlighted sections must be modified by the consultant to be project specific.

As-built Drawings Model

The University maintains a model of geometric information of the physical objects of University buildings and grounds in REVIT (both native .RVT files, and federated model in Navisworks .NWD format), CAD drawings and databases. The model is drawn at a real-world scale of 1:1 and geographically coordinated with the University survey network. All documentation provided by the consultant will eventually integrate with the model and should be prepared to be compatible. The model includes information about these items:

- Architectural components (i.e. walls, doors, windows, columns, etc.) which form the basis of as-built drawings
- Engineering components (i.e. structural elements, mechanical, and electrical)
- Building services components (i.e. fire, communication, etc.)
- Items that have potential value and require periodic servicing
- Non-graphical data are required within the project specific Construction BIM Execution Plan (BEP)

The model shall include installation details. The expectation is that all as-built drawings shall be produced in REVIT, unless:

- The project scope does not warrant the additional cost of BIM
- Specific exemption is given by the Director of Property Services, or
- An existing building where the project is contained is not rendered in a Revit model.

It is expected that the contractor shall refer to section 19.5 of this document for specific requirements regarding BIM and REVIT.

19.3.4 Operation & Maintenance Manuals

The Contractor shall provide maintenance manuals for all installed equipment and systems. The University will determine on a project by project basis if OmTrak is to be used for O&M manuals and advise the project team.

O&M manuals are to be completed based on the as-built matrix. It is the consultant's responsibility to review draft and final O&M manuals as per industry standards. Prior to the final O&M manual handover to the University, each consultant shall sign off the O&M Manual and Construction Record Handover Sign Off Checklist (Refer to Appendix D).

The requirements for the manuals are:

- Only electronic manuals are required, and these must be supplied in both MS Word and PDF format.
- A single compiled manual is required for each trade. The contractor must submit all required manuals together electronically.

- The space, door and plant numbers recorded on contract drawings may change during the project. The contractor must confirm the final numbering system with the engineer prior to preparing the O&M documentation.
- The manual for each system shall include the following sections. Refer to Appendix E for full details of the requirements for each section:
 - Cover page
 - Contents page
 - Section 1 Introduction and Scope
 - Section 2 Description of Systems
 - Section 3 Assets
 - Section 4 Operating Instructions
 - Section 5 Routine Maintenance
 - Section 6 Manufacturers' Technical Data
 - Section 7 Inspection, Testing and Commissioning Records
 - Section 8 Certificates, Warranties
 - Section 9 Spare parts
 - Section 10 Help and Contact
 - Section 11 Construction Record & As-built drawings

If the project employs OmTrak then the O&M manuals are managed and exported from the system. Information on how to use this system can be obtained by contacting WebFM Omtrak:

Company name: WebFM NZ Ltd.

Phone: 0800 600 070

Email: sales@webfm.net

Further details of the O&M manual procedure are depicted in **Error! Reference source not found..**

19.4 Asset Registration Process

19.4.1 Equipment Reference Numbers in Maximo

The University uses the asset management system, Maximo to optimise the life-cycle management of assets.

The correct Maximo label must be allocated to each asset early in the design / construction phase.

The correct equipment references must also be used when the project BMS graphics and software are developed. If this doesn't happen, the project risks late or inaccurate development which will need to be amended later.

19.4.2 Asset Label Workflow

The asset label (Maximo) allocation workflow for both new and refurbishment projects is outlined in **Error! Reference source not found.** and Appendix H .

Reference is made to **Insite**, which is the University's space database used for space planning and management.

Maximo labels cannot be provided if the room number is not provided / known.

19.4.3 Asset Registration Form

The project team must obtain the latest asset label registration form from the University's asset team.

The **Instructions** tab on the Asset Label Registration form provides a comprehensive outline of the procedure, the roles, and the responsibilities for asset registration and labelling (Appendix I). It is important that all PMs and consultants understand this process.

Appendix J shows an example of the new asset label registration form which is used for the allocation of Maximo numbers, while Appendix K shows an example of the existing asset form.

The University's Facilities Management team use Maximo to schedule compliance maintenance procedures that are used to obtain BWOFs. This means all compliance items, and life safety systems shall be populated as early as possible (i.e. contractor's correct Maximo referencing of fire dampers).

19.5 Building Information Modelling (BIM)

19.5.1 BIM Requirements

The design of the building should be modelled using Revit as its BIM platform. If the consultant or contractor does not utilise BIM models for the project, they must complete the PS Design Standards and Guidelines Design Dispensation form (Section 25). The University’s BIM workflow is depicted in Appendix L

It is a project requirement for Revit to remain the common data environment (CDE) during the development of construction issue documents, and through to the final As-built record of the completed project.

The project BIM process follows the New Zealand BIM Handbook (3rd edition 2019), which is freely available at this website: [NZ BIM Handbook – BIMinNZ](#)

Appendix M contains supplementary material that is related to the University’s BIM requirements.

19.5.2 Client Specific Requirements

Integrated asset data within the BIM model is a specific client requirement. This information must be collected and collated for inclusion in the University’s asset management system, Maximo. As building services elements are modelled for the purpose of shop drawings, asset information is to be transferred for final inclusion in the Maximo system.

Table 4 lists attributes/tags/information that are to be provided with services equipment elements.

Table 4: Information related with services equipment

Data required	Format example
Maximo number as allocated by the University’s asset management team	507-AHU-1-1
Asset description	AHU serving level 1
Vendor/supplier	
Manufacturer	
Make	
Model	
Serial number	
Location (architects room number)	1.01
Connected system	Fresh Air to Zone xx
Warranty start date	xx/xx/20xx
Warranty end date	xx/xx/20xx
Asset replacement cost (retail value)	\$

19.5.3 BIM Use Competency Requirements

Table 5 explains the value, experience and competencies required by the responsible parties on a BIM enabled project.

Table 5: BIM use competency requirements

BIM Use	Value to project	Responsible parties	Value to responsible parties	Competencies and requirements
Design authoring	High	Design team	High	<ul style="list-style-type: none"> Operating ability with project BIM platform (Revit). Design and construction experience.
Design review	High	Design team, contractor, client BIM representative	High	<ul style="list-style-type: none"> Ability to manipulate and navigate project BIM review software (Navisworks). Strong understanding of building systems integration.
3D coordination	High	Design team, contractor, subcontractors	High	<ul style="list-style-type: none"> Ability to manipulate and navigate project BIM review software (Navisworks). Experience in running clash detection. Proven prior experience in construction coordination. Sound building services knowledge.
Record modelling	High	Design team, contractor, subcontractors	High	<ul style="list-style-type: none"> Operating ability with project BIM platform (Revit). Access to project change management documentation/As-built mark-ups. Understanding of the intended Facility Management (FM) use of Record Model. Ability to communicate between design, construction and FM teams.
Construction system design (virtual mock-up)	Medium	Contractor, subcontractors	High	<ul style="list-style-type: none"> Sound construction experience. Full understanding of mock-up constraints.
Digital fabrication	Low	Subcontractors	Medium	<ul style="list-style-type: none"> Thorough understanding of interoperability issues between all software platforms in the fabrication workflow. Access to and communication with project 3D coordination process
Phase planning (4D modelling)	Medium	Contractor	High	<ul style="list-style-type: none"> Thorough understanding of the project programme. Ability to communicate and make changes to the project programme. Ability to receive and react to actual construction events and keep the 4D model up to date.
Asset management	High	University PM, contractor, subcontractors	High	<ul style="list-style-type: none"> Understanding of the requirements and workflow for Asset Labels (Maximo Numbering). Effective communication with the University's Asset Team. An understanding of the use of Maximo Numbers by all stakeholders (i.e. BMS) to ensure a timely processing of AM data.

19.6 Consents and Certificates

The PM will ensure all consultants and contractors confirm all consent (resource and building) conditions have been met.

If any conditions are outstanding, the consultants / contractors must recommend a course of action for their completion, for approval by the PM (e.g. can be included in Defects Liability Snag List).

With regards to building consents for any structures, the PM will ensure the contractor has gained the necessary building consents prior to the structure being made available for public use (i.e. Certificate for Public Use/ Code of Compliance).

Table 6: Compliance certification

Time Frame	Requirements	Action	Who
-2 Months to practical completion	Building consent conditions	Review Building Consent conditions	Consultant / Contractor
	Certificate for public use (if required)	Apply for Certificate for Public Use. Required when: <ul style="list-style-type: none"> Public (i.e. not staff, but including students) use building and Code of Compliance Certificate not yet available 	Consultant / Contractor
3-6 Months after practical completion	Code of compliance certificate	<ul style="list-style-type: none"> Completed Producer Statements (PS2, PS4, etc.) Obtained Fire Protection Inspection Services approval (if required) As-built documentation Completed building consent site inspection checklist returned Commissioning reports / results 	Consultants / Contractor

Appendix A Feedback Form

We love hearing from you. Please take a few moments to let us know how we can improve the *Property Services Design Standards and Guidelines*.

1.	Name:			
2.	Contact Details: (in case we need clarification)			
Complete this section if you have found a typo / formatting error. (If possible, attach a photo of the error)				
3.	Section No:		Page No/s:	
	Description of error:			
Complete this section if you have a suggestion about content.				
4.	Section No:		Page No/s: (if applicable)	
	Suggestion/s:			
Complete this section if you have any other suggestions for improvement.				
5.	Suggestion/s:			
6.	Email your feedback to PTechServices@auckland.ac.nz			
Thanks for your feedback!				

Appendix B Example of As-built Matrix

This is not an exhaustive list. Please add or omit sections as necessary depending on specific project

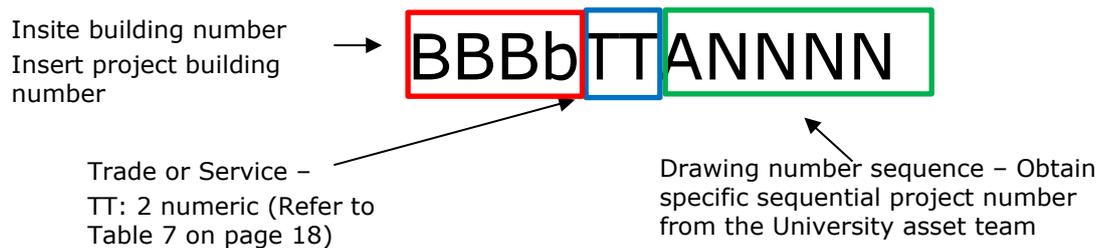
		PROJECT NAME		Manual										11. Construction Records				
Reviewer	Check Sheet Sign off	P&G Section		1. Introduction & Scope	2. Description of systems	3. Assets	4. Operating Instructions	5. Routine Maintenance	6. Manufacturer's Technical Details	7. Inspection, Testing & Commissioning Records	8. Certificates & Warranties			9. Spare Parts	10. Help & Contact	11. Construction Records		
		Trade	Sub-trade	General Description	Functional description	Assets	Operations & technical data	Maintenance	Product Data Sheets	Commissioning Information	Certificates PS3	Certificates PS4	Warranties	Spares	Help & Contact	Drawings	Documents	
	Provider														As-Built (PDF & DWG)	IFC (PDF & DWG)	Specification	Schedule
na	Consultant	Structural																
n/a	Consultant	Architectural Services																
		Mechanical																
		Electrical																
		Hydraulic																
		Acoustic																
		Other																
na	Consultant	Architectural - General																
na	Consultant	Finishes																
Consultant	Contractor	Doors																
Consultant	Contractor	Hardware																
Consultant	Contractor	Ceilings																
Consultant	Contractor	Internal wall panels/cov																
Consultant	Contractor	Interior partitions																
Consultant	Contractor	WC Partitions																
Consultant	Contractor	Internal glazing																
Consultant	Contractor	Floor coverings																
Consultant	Contractor	Façade - cladding																
Consultant	Contractor	Façade - window joinery																
Consultant	Contractor	Roof - General																
Consultant	Contractor	Roof - Skylights																
Consultant	Contractor	Roof - Rainwater system																
Consultant	Contractor	Height Safety																
Consultant	Contractor	Auto doors - Roller																
Consultant	Contractor	Auto doors - Sliding																
Consultant	Contractor	Auto doors - Pivot																
Consultant	Contractor	Fire curtains																
Consultant	Contractor	Passive Fire Protection																
Consultant	Contractor	Smoke curtains																
Consultant	Contractor	Smoke/Fire Doors																
Consultant	Contractor	Fume cupboards																
Consultant	Contractor	Lab bench joinery																
Consultant	Contractor	Waterproofing/Tanking																
Consultant	Contractor	Window treatments																
Consultant	Contractor	Site Services																
Consultant	Contractor	Drainage																
Consultant	Contractor	Plumbing																
Consultant	Contractor	Electrical																
Consultant	Contractor	High Voltage																
Consultant	Contractor	Low Voltage																
Consultant	Contractor	Fire Protection																
Consultant	Contractor	Fire Alarms																
Consultant	Contractor	Fire Sprinklers																
Consultant	Contractor	Fire Suppression systems																
Consultant	UoA	Fire Report																
Consultant	Contractor	Lifts																
Consultant	Contractor	Mechanical																
Consultant	Contractor	HVAC																
Consultant	Contractor	Elec. for Mech.																
Consultant	Contractor	Extract systems																
Consultant	Contractor	Specialist systems																
Consultant	Contractor	Security																
Consultant	Contractor	Telecommunications																
na	Consultant	Fire Evacuation Scheme																
Various	Contractor	Asset Label Request Form																
na	Contractor	Code Compliance Certificate (CCC)																
na	Contractor	CCC Compliance Schedule																

Appendix C As-built Drawing Requirements

University Drawing Reference Standards

This standard was developed to ensure all drawings are given a unique number, and can be filed in building and trade hierarchy.

This diagram shows the parts of a drawing reference:



Example:

For the drawing reference: 30120A0010 & 501C55D0320 & 6EB30H2345

- 1st is for building **301** trade **20** (Architectural) and sequence **A0010**.
- 2nd is for building **501C** trade **55** (Electrical for Mechanical) and sequence **D0320**.
- 3rd is for building **6EB** trade **30** (Drainage) and sequence **H2345**.

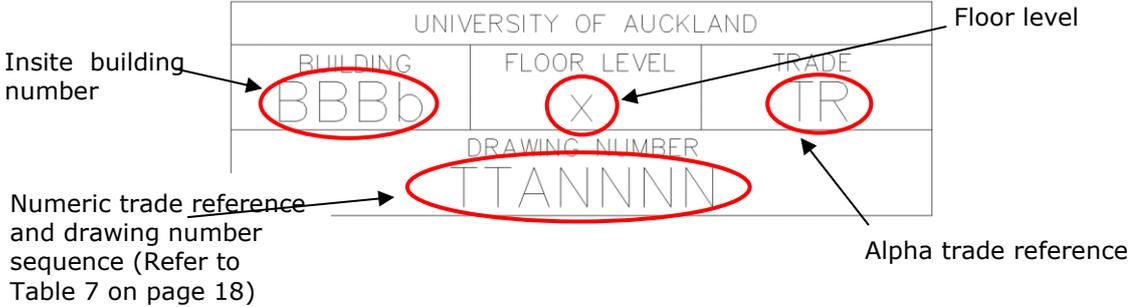
Trade / service numbers

Table 7: Trade details for drawing numbering

Trade	Example	Examples
00 - Survey	SU – bbb 00 annnn	Site Survey Plan
10 - Structural	ST – bbb 10 annnn	As specified by the structural design engineer
15 - Seismic	SE – bbb 15 annnn	Seismic Plan
20 - Architectural	AR – bbb 20 annnn	Safety Lines; or As specified by the architect
30 - Drainage	DR – bbb 30 annnn	Drainage Site Plan Drainage Schematic or Isometric Drainage Layout – Level x Drainage Sections & Details – Level x Where applicable to a building the same applies to 'Chemical Waste.'
40 - Plumbing	PL – bbb 40 annnn	Plumbing Site Plan Plumbing Schematic for Isometric Plumbing Layout – Level x Plumbing Sections & Details – Level x Where applicable for larger buildings the gas, compressed air, deionised water, oxygen and nitrogen can be separated into individual trade drawings to make drawing less complicated.

Trade	Example	Examples
50 - Mechanical	ME – bbb 50 annnn	Plant Room xx – Level x <ul style="list-style-type: none"> • Ducting Schematic or Isometric • Ducting Layout – Level x • Ducting Sections & Details – Level x • Pipe Work Isometric • Pipe Work Layout – Level x • Pipe Work Sections & Details – Level x • Chilled Water Schematic or Isometric • Condensing Water Schematic or Isometric • Heating Water Schematic or Isometric, etc.
55 - Electrical for Mechanical	EM – bbb 55 annnn	<ul style="list-style-type: none"> • Control Panel Schematic DB x-x – Sheet 1 of x • Control Panel MSS-bbb – Sheet 1 of x • Control Panel MSS –bbb Details Sheet 1 of x • Control schematics
60 - Electrical	EL – bbb 60 annnn	<ul style="list-style-type: none"> • Power Distribution Schematic: For MSB, DB, Emergency Lighting and Mechanical DB • Power Distribution Layout – Level x: For MSB, DB, Emergency Lighting and Mechanical DB • Power Layout – Level x: Including Electrical heating and with all DBs indicated • Lighting Layout – Level x: With all DBs indicated • Emergency Lighting Layout – Level z: With all DBs indicated • Luminaire Schedule • Audio Visual Cable Schedule – Theatre x: For each theatre separately • Audio Visual Control Schematic – Theatre x: For each theatre separately • Audio Visual Equipment Layout – Theatre x: For each theatre separately.
68 - Telecommunications	TE – bbb 68 annnn	Telecommunications BD & FD Schematic: Include main cable routes Telecommunications Layout – Level x: With BD & FD indicated
70 - Fire	FI – bbb 70 annnn	<ul style="list-style-type: none"> • Sprinkler Schematic or Isometric • Sprinkler Layout – Level x: For each level in the building • Sprinkler Sections & Details Fire Hose Reel Schematic or Isometric Fire Hose Reel Layout – Level x <ul style="list-style-type: none"> • Fire Alarm Controls Schematic or Isometric • Fire Alarm Equipment Layouts – Level x • Fire Alarm Equipment Sections & Details – Level x Fire Equipment Layout – Level x: (As inspected by Actron – only hand-held equipment) <ul style="list-style-type: none"> • Passive Fire Penetrations • Fire & Smoke Doors and Curtains
75 - Hazard	HZ – bbb 75 annnn	Hazardous Substances & Containment Locations
80 - Lift	LI – bbb 80 annnn	<ul style="list-style-type: none"> • Schematics • Sections • Details
90 - Landscaping	LA – bbb 90 annnn	<ul style="list-style-type: none"> • Site Plan • Landscape Details

As-built Drawing Procedure

Step	Action
1.	<p>The contractor will assign each as-built drawing a unique reference following the University's drawing reference standard. Use the reference standard outlined at the start of this section.</p>
2.	<p>In each CAD as-built drawing:</p> <ul style="list-style-type: none"> • Insert the University title block in the lower right corner of the drawing (the .dwg file will be provided, or can be requested from the Asset Team) • Complete the drawing reference details as per below instructions. <p>All other information in the typical drawing title block is to remain. The University's title block is additional to this information.</p> <p>All drawings that originate from the Revit model shall be provided in PDF format with the University's title block.</p> <p>All drawings that originate from AutoCAD files shall be provided in .dwg format with the University's title block.</p> <p>This diagram shows the parts of a generic University title block:</p>  <p>For the floor level:</p> <ul style="list-style-type: none"> • Use the Insite floor level reference • If a drawing applies to multiple levels (e.g. a building schematic) then include all levels in the field e.g. 1,2,3,4 or 1-4. <p>In each PDF drawing:</p> <ul style="list-style-type: none"> • Ensure the University title block is in the lower right-hand corner with correct information completed • Ensure the University Insite room numbers are on all drawings. • Save each drawing with a unique University drawing reference (e.g. 405TTANNNN.pdf) <p>In each CAD drawing:</p> <ul style="list-style-type: none"> • Ensure the University Insite room numbers are on all drawings. • <u>Bind the Xreferences (to prevent missing Xreferences in future when trying to open the drawings)</u> • Purge and zoom extents • Save each drawing as the unique University drawing reference (e.g. BBBbTTANNNN.dwg) • If a .dwg file contains multiple plans: <ul style="list-style-type: none"> • After adding and completing the University title block for each layout (plan), separate into individual files then purge, zoom extents and save file as the unique University drawing reference.
3.	<p>Print PDF drawing files for O&M manuals from the CAD (.dwg) files so the University title block is included.</p>
4.	<p>Submit as-built drawings for review and completion as per the specification.</p>

Appendix D O&M Manual and Construction Record Handover Sign Off Checklist

O&M Manual and Construction Record Handover Sign off Checklist

(sign off to be provided with Final O&M manuals)

Consultant responsible for trade and Main Contractor to verify all Manual content has been provided, it is technically reviewed and formats of information are provided as per the Contract Preliminary and General requirements. These checks should include, but not be limited to:

1. Verify all documents have been provided in accordance with Preliminaries Appendix A – As Built Matrix document.
2. Projects with BIM Model: As Built Drawings provided in PDF format, each drawing as a separate file (for example, if there are 15 sheets of drawings, we require 15 x PDF files). Hand over BIM Model in the required format stipulated under Section 19.5.
3. Projects without BIM Model: As Built Drawings provided in DWG format, each drawing as a separate file (for example, if there are 15 sheets of drawings, we require 15 x DWG files).
4. DWG drawings – All the x-refs must be bound.
5. O&M in PDF format as one document (copy of PDF drawings embedded in O&M).
6. Ensure the Asset Label Registration form is completed with the required asset data/information and has been submitted accordingly.
7. Ensure that the unique UoA title block is inserted in the lower right corner of the As Built drawings (please refer to Section 13.2 of the Preliminaries document for further details).

Trade	Consultant Name	Signed	Date
-------	-----------------	--------	------

	Contractor Rep Name	Signed	Date
--	---------------------	--------	------

Appendix E O&M Manual Content

Introduction

The O&M Manual content shall comply with these requirements.

Cover page

The format of the cover page for each trade manual must be as shown in Figure 2

The University of Auckland (Correct building name and number) (The official project name and/or stage)	
Operating and Maintenance Manual For (Trade) Services (Month and year of practical completion)	
Consultant: (Name) (Mailing address) (Phone number)	Contractor: (Name) (Mailing address) (Phone number)

Figure 2: Format of O&M cover page

Contents page

Contents to be provided to the section level only.

Section 1 – Introduction and Scope

Provide a description of the overall installation covered by the manual.

Include an explanation of the purpose of the manual and a brief description of each section included in the manual. Describe that in general, Section 4 (Operating Instructions) details instruction for the building owner and Section 5 (Routine Maintenance) is intended for engineering personnel.

Where parts of the installation are supplied under other contracts or by the owner, related information shall be included in the manual or expressly excluded.

Section 2 – Description of Systems

Provide a technical description of each individual system, including:

- Function
 - Key design criteria (where applicable, e.g. HVAC design criteria)
 - Type and location of major equipment
 - Interfaces with other installations
 - Where parts of the installation are supplied under other contracts or by the owner, or were existing, describe how the Contract Works relate to those parts.
-

Section 3 – Assets

Provide an Asset Register listing all systems, equipment and materials installed, identifying manufacturer, model, supplier, location, duties, details (e.g. serial number, speed, motor size, belt size, bearings, etc.), and quantity.

For systems aggregating many minor components (e.g. controls) a schematic drawing showing all model numbers etc., may be included in lieu of their inclusion in the register.

Section 4 - Operating Instructions

Operating instruction shall be concise and clear to ensure unqualified personnel can operate the system.

Describe the procedures necessary to operate the plant under normal operating conditions, plus other operations which may be carried out by unqualified personnel under abnormal or emergency conditions, e.g. power failure.

Where appropriate, describe normal operating characteristics, any special operating requirements and/or constraints, and how best to operate the system under different conditions to obtain the most energy and cost-efficient operation, e.g. seasonal changeovers.

Provide information applicable to facility managers/operators as required to satisfy the obligations of PCBUs (Person Conducting a Business or Undertaking) in accordance with the Health & Safety Act. For example;

- Notes, cautions, warnings, and safe work practices against hazardous procedures or those likely to cause malfunctions, e.g. ;
 - Operating personnel should not remove switchboard or control panel cover plates due to risk of electric shock.
 - Operation of pressure equipment and systems, including location, function and operation of pressure activated safety relief and/or vacuum break devices, with a warning against deactivation or removal.
 - Location, function and operation of temperature and/or flow activated safety and/or interlock devices, with a warning against deactivation or removal.
 - Operation of gas distribution system and appliance safety devices.
 - A caution that operating personnel should not carry out any adjustments to control set points etc., unless they are aware of the consequences to the total system on adjusting the controls.
 - Describe alarm/warning indicators and functions, and remedial action required should they indicate, including, where appropriate, methods of overriding automatic control.
 - Reference to material safety data sheets.

- Describe relevant day-to-day routine operations, e.g. cleaning and general care, checking fuel levels, general inspection of plant rooms for undue noises, leaks, etc. This work, although classed as maintenance, should be included in daily operation instructions.
-

Section 5 - Routine Maintenance

Provide maintenance schedules listing routine maintenance inspections and activities, and the intervals at which they should be performed. Schedules shall;

- Comply with the relevant Compliance Schedules (as per Ministry of Business, Innovation & Employment's Compliance Schedule Handbook, Section 3 - Compliance Schedule Content Guidelines).
- Identify the persons responsible as listed under the relevant Compliance Schedules.
- Identify any liaison with other maintenance personnel/contractors necessary to enable inspection and maintenance of inter-related installations.
- Identify relevant legislation and Standards.
- Identify any equipment specific safe work practices.

Maintenance procedures for proprietary equipment items shall be in accordance with the manufacturer's written recommendations and shall include recommendations for periodic vibration measurement and analysis where appropriate. Include manufacturer's relevant technical literature or reference literature included under Manufacturer's Details.

Provide information applicable to maintenance personnel as required to satisfy the obligations of PCBUs (Person Conducting a Business or Undertaking) in accordance with the Health & Safety Act.

Section 6 – Manufacturers' Technical Data

Include manufacturer's technical literature (e.g. data sheets) for all materials, equipment and systems installed and/or assembled specifically for the project. Mark each sheet as necessary to clearly identify information relevant to the specific equipment used in the installation.

Section 7 – Inspection, Testing and Commissioning Records

- Signed records of inspections, testing and commissioning by proprietary product / equipment suppliers.
 - Completed and signed testing and commissioning records.
-

Section 8 - Certificates, Warranties

- Product type test certificates.
 - Refer to 19.6 for information on Construction Producer Statements, Consent and Certificates of Compliance.
 - Manufacturers' written warranties and guarantees, made out to the Principal, referencing the specific Contract Works, commencement and expiry dates, signed and dated by the relevant manufacturer or their authorised agent.
-

Section 9 - Spare Parts

- Schedule of consumables (e.g. belts, lubricant, etc.) and their source of supply. Records shall provide all information necessary for reordering consumables without the need to inspect installed equipment.
 - Provide a schedule of spare parts recommended to be held on site, being those items subject to wear or deterioration and which may involve the principal in extended deliveries when replacements are required. Include complete nomenclature and model numbers, and local sources of supply.
-

Section 10 – Help & Contact:

- Record names, addresses, phone numbers and web-site/email addresses of the relevant consultants, contractors, and principal sub-contractors.
 - Provide names, addresses, phone numbers and web-site/email addresses of suppliers/manufacturers of materials, equipment and systems listed in the Asset Register.
-

Section 11 - Construction Record Drawings

PDF and DWG format required, refer requirements outlined in section 19.3.3 and Appendix C

Appendix F O&M Guidelines

Introduction

Procurement shall include project specific input from the Proprietary Electronic O&M Manual System supplier required for the training of system users, system set-up, and O&M Manual production as required by this Specification Section.

Future updates (e.g. post contract to suit future alterations) typically should be made by separate engagement of the Proprietary Electronic O&M Manual System supplier, but with capability to assign live web version editing rights to designated external parties on a case-by-case basis based on specific user capability.

Relevant Parties involved in Production/Review of O&M Manuals

Where referred to in sub-sections below, relevant parties involved in the production and review of O&M Manuals shall include:

- The Principal and/or their authorised agents, e.g. facilities management personnel, independent commissioning manager.
 - Contractor/sub-contractor staff.
 - The Proprietary Electronic O&M Manual System supplier.
 - The Engineer.
 - Any other parties identified by the above parties.
-

System Set-Up Workshop

Arrange a System Set-Up Workshop with all relevant parties involved in the production and review of O&M Manuals, conducted by the Proprietary Electronic O&M Manual System supplier, such as to:

- Ensure the correct base facility and or asset data is used in the system.
- Agree the overall O&M Manual structure and scope for all relevant trades involved in the delivery of the contract works.
- Agree O&M manual production and review procedural details, e.g. respective roles and responsibilities of the relevant parties, notification procedures, etc.
- Agree any special requirements to be addressed in the O&M Manuals.

Conduct the Set-Up Workshop early in the project term to allow all parties enough time to enable progressive data input prior to relevant completion milestones.

Training in use of Proprietary Electronic O&M Manual System

Provide suitable training in the proper operation of the system, by the proprietary electronic O&M manual system supplier, to all relevant parties involved in the production and review of O&M Manuals as listed above.

Access

During the O&M Manual production and review process, provide all relevant parties as above with internet access to the electronic files.

Production, Submission and Review Procedures

It is the contractors' responsibility to

- Review the O&M manuals to ensure that they comply with industry standard. Before handover the O&M Manual and Construction Record Handover Sign off Checklist is to be completed by the contractor (Appendix D).
- Progressively upload operations and maintenance data in accordance with the production milestones in Table 8.
- Prior to milestone submissions, verify content for accuracy and completeness. Notify relevant parties when a section or an entire manual is complete and ready for review.
- The contractor and relevant review parties shall use the Proprietary Electronic O&M Manual System's task notification process where this feature is included.
- Refer to Appendix E and comply with O&M manual requirements.

During the Defect Liability Period, update all copies of issued electronic O&M manual files with details of fine-tuning adjustments, post-occupancy recordings, post occupancy reports, midsummer/midwinter tests, and defect rectification as appropriate.

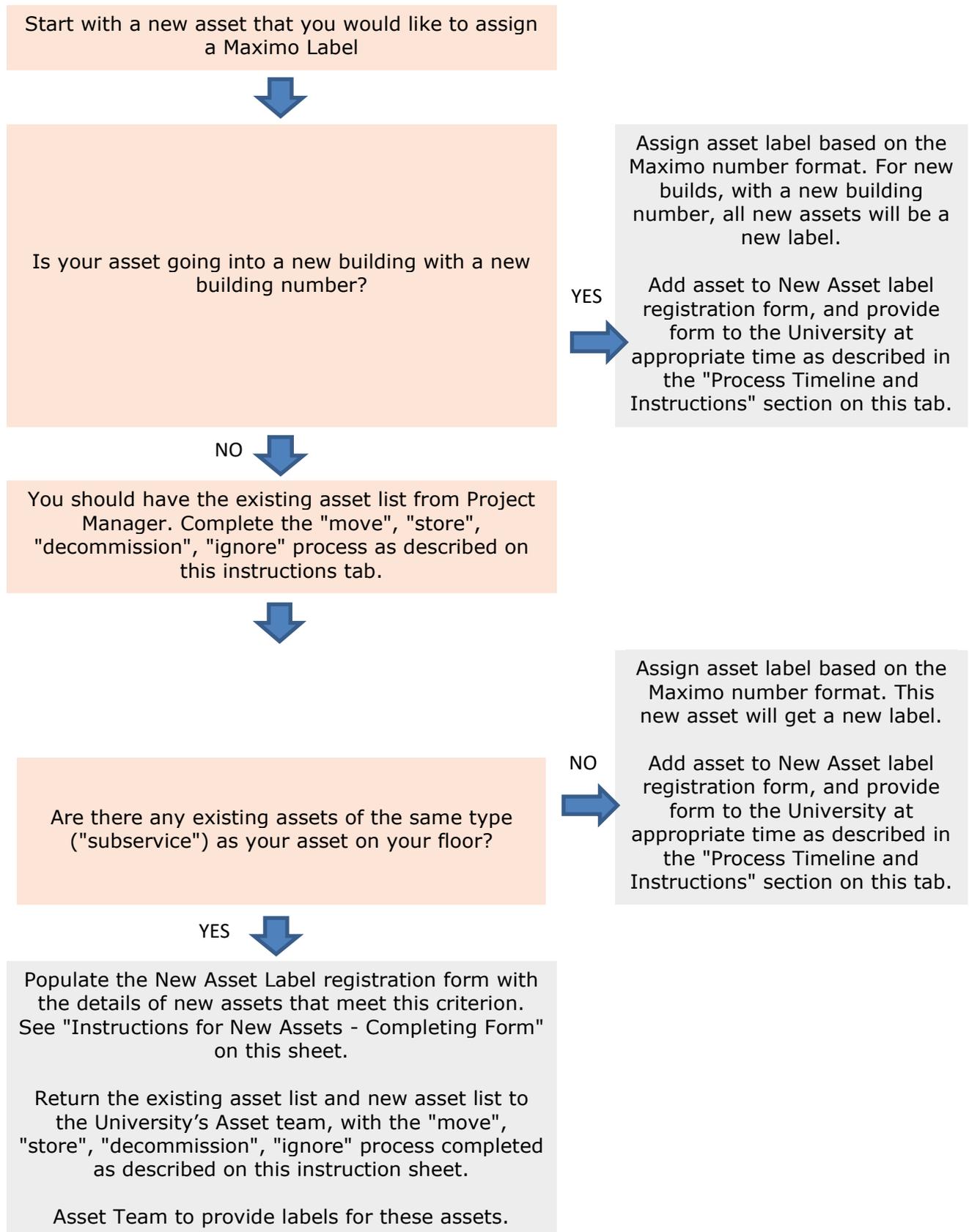
Table 8: Electronic O&M manual production milestones

Task / Section	Production Milestones
O&M Manual Set-up Workshop	50%
Introduction & Scope	70%
Description of Systems	70%
Assets	85%
Operating Instructions	85%
Routine Maintenance	85%
Manufacturers' Technical Data	70%
Inspection, Testing and Commissioning Records	100%
Certificates, Warranties	100%
Spare Parts	100%
Help & Contact	70%
Construction Record Drawings	100%
Complete tasks prior to stated % of Contract Period from Contract Acceptance to Practical Completion.	

Formats

- Use database and PDF formats as single electronic systems with suitable hyperlinks to all associated files and documents for easy retrieval and use by the Principal.
- Include Construction Record Drawings in the format specified in the "Construction Record Drawings" section under the contract preliminary document. An additional copy shall be provided in PDF format. Uploaded files shall not be zipped.
- PDF files shall be a true copy of the native file in the same page size and scale.
- Attached files shall be adequately described in the Omtrak System's Heading and description text fields, including drawing number, title, description of works, revision, date, location (e.g. Building Number on multiple building sites) and the like.

Appendix G Asset Label Assignment Process



Appendix H Asset Label Process Timeline

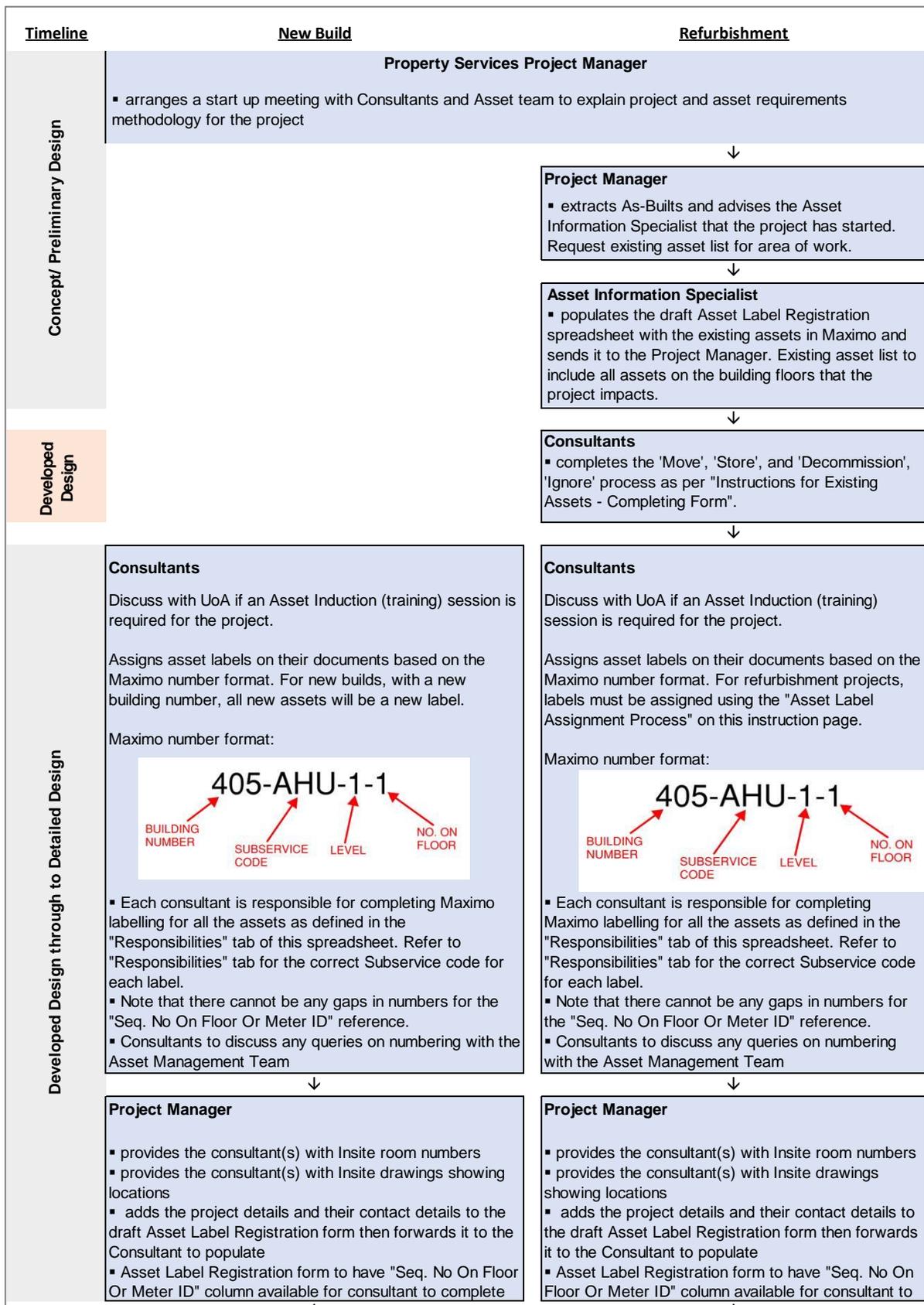


Figure 3: Asset label process flow

Appendix I Instructions for Completing Asset Form

Instructions for New Assets

- Open the blank template and use 'Save As' to save the form to a convenient location with a new unique filename.
 - Enter the Project Number, Project Manager's name, contact phone number and email address into the appropriate cells on the top right of the New Asset tab.
 - If the asset is inside the building, enter the room number where it is located. If the asset is outside, enter the number of the room it is outside of.
 - "Working from left to right, click on the dropdown list to select the Service, Classification Pathway and Descriptor. If you make a mistake, delete all data in the row from the dropdown boxes and start again. Consultants must fill the following columns:
 - Service, Subservice, Descriptor, Additional Information (where required), Building Number, Level, Room (Insite room number only e.g. for Insite number 103-110 just enter ""110""), Location Description (where required), and Seq No. On Floor or Meter ID. Note that Maximo follows Insite for level references.
 - Refer to the chart in Appendix H if you are unsure as to whether an asset comes under 'Mechanical' or 'Plumbing'.
-

Instructions for Existing Assets

- At the start of a refurbishment project send an email to assetmanagement@auckland.ac.nz requesting a list of assets in the relevant area/building.
 - You will receive a copy of the Asset Registration Form spreadsheet populated with the assets in the relevant area/building.
 - Enter the Project Number, Project Manager's name, contact phone number and email address into the appropriate cells on the top right of the New Asset tab.
 - For all rows select from the drop-down menu in the column entitled "Move, Store, Decommission, Replace or Ignore".
 - Click on 'Decommission' for assets that will be removed from the University of Auckland campus.
 - Click on 'Store' for assets that will be put into storage.
 - Click on 'Move' for assets that will be relocated to another area/building.
 - Click on 'Replace' for assets that will be replaced by a new asset listed in the new asset tab and reference the row number
 - Click on 'Ignore' for assets that will be unaffected by the project works.
 - Enter the project's practical completion date under 'Date of Change'.
 - If an asset will be moved or stored, enter the new location under 'New Location'.
-

Appendix J New Asset Label Registration Form

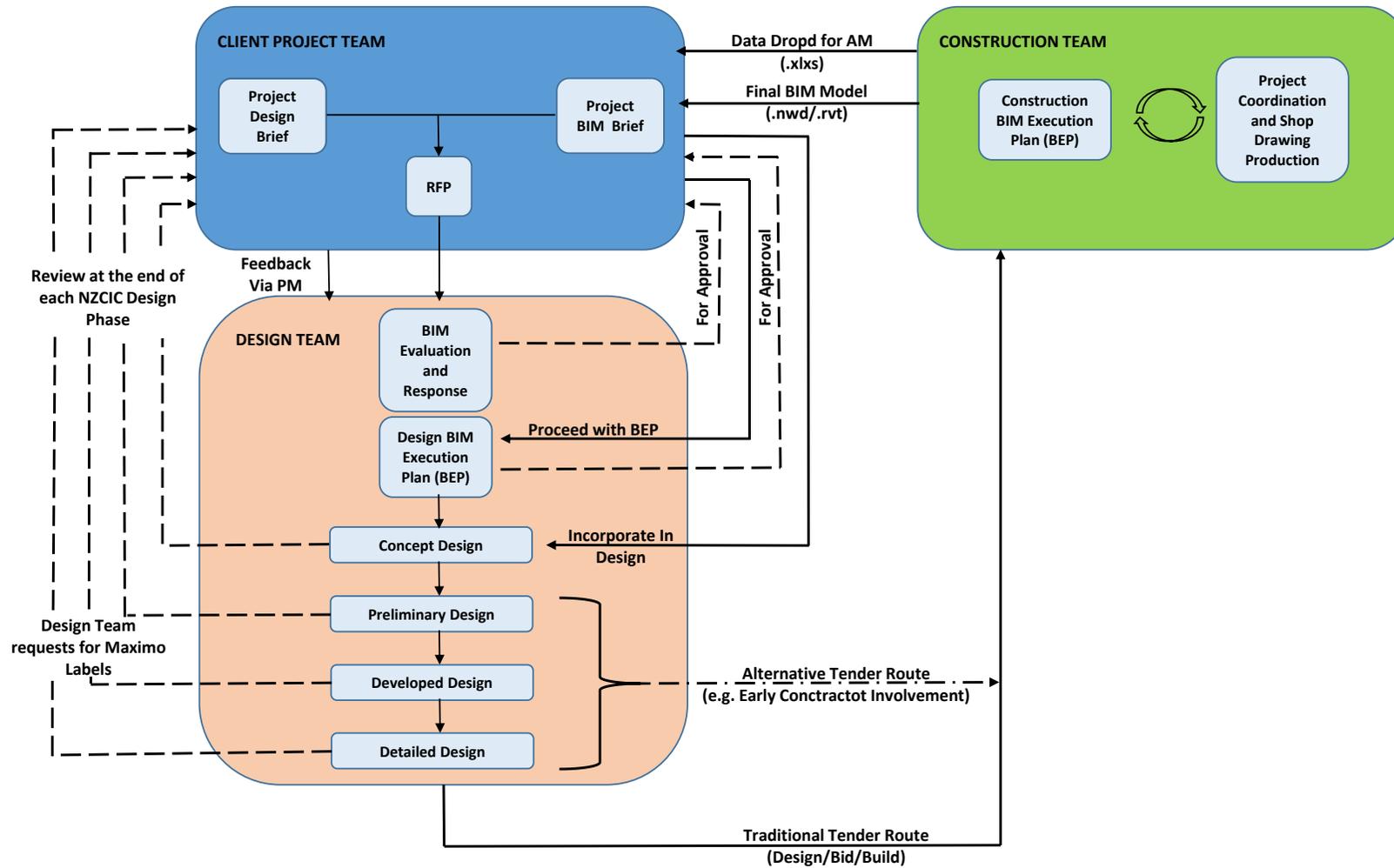
Version 2.10		Asset Label Registration Form														THE UNIVERSITY OF AUCKLAND NEW ZEALAND		
Project Number:																		
Project Manager:																		
Contact Phone Number:																		
Email Address:																		
Service	Subservice	Descriptor	Building Number	Level or RF	Room No. (Inc. Level)	PC Date (DD/MM/YY)	Instruction for Additional Information	Additional Information	Asset Location Description (For hidden or difficult to identify assets)	Seq. No. On Floor / Meter ID (TBC by AM Team)	Maximo Asset Label	Make	Model	Serial Number	Area / Quantity	Retail Cost \$	WTY End	Life Expectancy (yrs)

Version 2.10		New Door Asset Registration Form														THE UNIVERSITY OF AUCKLAND NEW ZEALAND	
Project Number:																	
Project Manager:																	
Contact Phone Number:																	
Email Address:																	
Type of Door	Fire or Smoke Protection	Descriptor	Building Number	Level or RF	Room No. (Inc. Level)	PC Date (DD/MM/YY)	Instruction for Additional Information	Additional Information	Asset Location Description (For hidden or difficult to identify assets)	Seq. No. In Room (TBC by AM Team)	Door Label	Make	Model	Serial Number	Retail Cost \$	WTY End	Life Expectancy (yrs)

Appendix K Existing Asset Form

Version 2.10		Existing Assets														THE UNIVERSITY OF AUCKLAND NEW ZEALAND			
Project Number:																			
Project Manager:																			
Contact Phone Number:																			
Email Address:																			
Asset	Description	Direction	Label	Classification	Class Structure	Location	Type	Status	Installation Date	Make	Model	Serial Number	Condition	Risk rating	Move, Store, Decommission, Replace or Ignore	Date of change DD/MM/YY	New Location	New Asset Label for Moved Assets	Comments

Appendix L BIM Workflow



Appendix M BIM Requirements

Introduction

The 2019 version of the Handbook follows the NZCIC Design Documentation Guidelines and includes the appendices which are also used during the BIM implementation on the project. This document shall be read in conjunction with the project specific Construction BEP. BIM documentation should address the requirements detailed in the project specific BIM Brief produced by the University.

BIM is a digital representation of the physical and functional characteristics of the building, and as such contains both a 3D model and non-graphical data. As a collaboration tool, BIM has numerous uses, with the following required by the Principal:

- Following the issue of a Detailed Design BIM model, the Contractor is to own, manage, develop and execute the Construction BIM.
- Shop drawings are to be produced in BIM using Revit.
- The model will be used to eliminate site clashes by undergoing a 3D coordination process. Roles and responsibilities are detailed in the construction BEP.
- Seismic bracing in accordance with NZS4219 shall be included in the model.

Asset data required by the University of Auckland's legacy Asset Management System, Maximo will be included in the model as detailed in the University's BIM Brief. The construction BEP shall include details of this data, and a process flow of how asset Maximo numbers are to be obtained. The Contractor is to provide a Construction Record BIM on completion.

C45E.2 Contractor BIM Management

The Contractor shall appoint a Building Services experienced Construction BIM Manager. (This may be the main contractor, a separate building services design/modeling consultant, or the mechanical services contractor.) The Construction BIM Model Manager shall:

- Chair regular trade coordination meetings
- Be responsible for the Construction Coordination and As Built BIMs
- Coordinate the various Building Services trades to input to the BIM
- Ensure the required As Built asset data is included in the BIM are checked prior to data transfer.

The Building Services trades shall:

- Attend trade coordination meetings as required
- Provide information as required for incorporation into the BIM
- Work with other parties to coordinate details and resolve clashes
- Populate the BIM with the required asset data in a timely manner for transfer prior to handover.

Throughout construction, a federated Navisworks model will be issued to the Client BIM Representative. The purpose is to offer reassurance to the Client that the model is being developed correctly, complete with asset data uploaded in a timely manner. Equipment data will be viewable as item properties when viewed in Navisworks Manage.

C45E.3 Model Description Document (MDD)

Each issue of the BIM shall be accompanied by a Model Description Document (MDD) describing the model contents and explaining its purpose and limitations.

C45E.4 Detailed Design BIM

Content

Building systems/components to be modeled in Revit:

- Architecture
- Structure
- Plumbing and Drainage
- Mechanical Services
- Electrical Services
- Fire Protection Services
- Laboratory gases
- Seismic Restraints in accordance with NZS4219

The Detailed Design BIM shows major Building Services plant and equipment and general routes of Building Service linear components (ductwork, pipework, and major cable support systems) coordinated with the primary building structure and architectural elements at key pinch point locations. Equipment references given are Maximo numbers that have been allocated by the University Asset Management Division. The Detailed Design BIM may include clashes of secondary components that will require detailed coordination and resolution by the Contractor as part of Construction Phase Design. Does not include detailed linear component layouts with all necessary bends, offsets and the like, which shall remain the responsibility of the Contractor as part of Construction Phase Design as specified elsewhere.

The following Building Services systems and components are not included in the Detailed Design BIM but shall specifically be incorporated by the Contractor in the Construction Design/Record BIM.

- Structured cabling
 - Electronic security
 - Audio visual
 - Lifts
 - Fire stops.
-

Issue of Detailed Design BIM

An electronic copy of the Building Services Detailed Design BIM will be provided to the Contractor within 10 working days following the issue of Contract Documents, from which point the Contractor shall take ownership of the model.

The Detailed Design BIM may be subsequently updated with design changes or clarifications as necessary to produce and issue revised Contract Drawings. Conversely minor design changes or clarifications may be instructed in sketch form only, without corresponding updating of the Design Phase BIM. The Contractor shall be responsible for incorporation of all such revisions into the Contractor's Construction Design BIM. The Contractor may request a copy of the updated Detailed Design BIM (following significant updates and at reasonable milestones) but shall remain responsible for synchronizing all the Detailed Design BIM updates into the Contractor's Construction Phase BIM.

C45E.5 Construction BIM

The Contractor's Construction BIM shall include but not necessarily be limited to:

- Actual proposed and reviewed plant and equipment complete with asset data as per the project specific BEP.
- The data source of Construction phase system design drawings and details as required by and in accordance with Specification Building Services General, Pre-Manufacture Submissions.
- Results of area-by-area co-ordination as Specification Building Services General, Co-Ordination.

The Construction BIM shall be used to produce pre-manufacture drawing submissions as required by and in accordance with Specification Building Services General, Pre-Manufacture Submissions.

Appendix N Index

3D coordination		Design Dispensation form	13
Competency requirements	14	Design review	
4D modelling)		Competency requirements	14
Competency requirements	14	Detailed Design BIM.....	34
Abbreviations.....	7	Issue	34
As-built		Digital fabrication	
Matrix	6, 8	Competency requirements	14
Matrix example	17	Documentation.....	6
As-built drawings.....	6, 9	Drawing number standards	
Model.....	10	Requirements	18
Procedure.....	20	Drawings.....	5
Requirements	10, 18	DVTDM.....	5
Submission process	9	Feedback Form.....	16
System set-up workshop	26	Insite	5, 12
Asset Form		Inspection, Testing and Commissioning	
Instructions	30	Records.....	24
Asset information	5	Manufacturers' Technical Data.....	24
Asset label		Maps.....	5
Workflow	12	Maximo	5
Asset Label		Numbers	12
Assignment process	28	Model Description Document.....	33
Process timeline	29	O&M	
Asset management		Guidelines	26
Competency requirements	14	O&M Manual and Construction Record	
Systems	5	Handover Sign Off Checklist.....	21
Asset Register	23	O&M manuals.....	6, 10
Asset Registration		Content	22
Form.....	5, 6, 12	Milestones	27
Process	12	Production	27
BIM	5, 13	Review	27
BIM Use Competency Requirements.....	13	Submission	27
Client Specific Requirements	13	O&M Manuals	
Models	5, 6	Formats	27
Requirements	33	OmTrak.....	10
Requirements	13	Operating Instructions	23
Workflow	32	Operation & maintenance manuals	10
Building consent conditions.....	15	Phase planning	
Building Information Modelling	13	Competency requirements	14
Certificate for public use.....	15	Project Documentation	8
Certificates	15	Project Drawing and Documentation	8
Certificates, Warranties	24	Project related documents	5
Code of compliance certificate.....	15	Proprietary Electronic O&M Manual System	
Consents and Certificates	15	Training	26
Construction Design BIM	35	Proprietary Electronic O&M manuals	
Construction Design BIM Management	33	System	26
Construction Record Drawings.....	25	R Drive.....	5
Construction system design		Record modelling	
Competency requirements	14	Competency requirements	14
Defect Liability Period	27	REVIT	5, 10
Description of Systems.....	23	Routine Maintenance.....	24
Design authoring		Service numbers	18
Competency requirements	14	Set-up meeting	8

Spare Parts.....	25	New Asset	31
Systems	5	Trade numbers.....	18
Template		Virtual mock-up	
Existing Asset	31	Competency requirements	14