



The Builders Guide to Operations & Maintenance Manuals



Table of Contents

ARE O&M MANUALS IMPORTANT?	3
ABOUT OMTRAK	3
CONTACT DETAILS	3
GETTING STARTED?	4
WHO SHOULD PREPARE THE MANUALS?	4
WHAT ARE THE ROLES IN PREPARING AND FINALISING THE MANUALS?	4
WHAT TABLE OF CONTENTS SHOULD I USE?	5
ARE THERE ANY STATUTORY REQUIREMENTS?	5
ABOUT STANDARDS AND O&M MANUALS?	5
ARE THERE ANY CONTRACTUAL REQUIREMENTS?	5
ARE THERE ANY ESD REQUIREMENTS?	5
HOW MANY MANUALS ARE NEEDED?	6
WHAT AS-BUILT DOCUMENTATION IS NEEDED?	6
WHAT FORMAT SHOULD I USE FOR THE MANUALS?	7
IS THERE A “GREEN” APPROACH TO O&M MANUALS?	7
WHAT ELECTRONIC FORMATS SHOULD I USE?	7
HARD COPY MANUALS?	8
WHAT SHOULD EACH TRADE INCLUDE IN THE MANUALS?	8
ATTACHMENT 1 – REGULATORY APPROACHES LEGIONELLA	10
ATTACHMENT 2– ESSENTIAL FIRE SAFETY MEASURES	11
WEBFM PRODUCTS AND SERVICES FOR CONSTRUCTION AND FM MANAGEMENT	12

Disclaimer

Any information contained in this document as a statement, opinion or implied comment is made in good faith and on the basis that WebFM are not liable (whether by reason of negligence, lack of care or otherwise) to any person for damage or loss whatsoever which has occurred or may occur in relation to that person taking or not taking (as the case may be) action in respect of strategy, statement, data, opinion or implied statement or otherwise.

Are O&M Manuals Important?

As buildings become more technologically advanced, owners and end users are demanding from Contractors a much higher level of detail and improved quality of information to ensure they get the best operating and maintenance outcomes from their new facility. A US report showed approx 65 to 85% of the cost of a new building occurred after handover¹.

O&M Manuals are also integral to meeting legal obligations for health and safety, essential services, duty of care and the like. The advent of “Green Buildings” or ESD (Environmentally Sustainable Designs) has also raised the stakes as commercial leases can be linked to maintaining the Green Rating.

When you realise the expensive part is not building but operating and maintaining the new assets you can understand the frustration of Owners and Facility Managers when O&M Manuals are not complete, poorly presented, or inadequate for the task.

This booklet seeks to provide some guidance to contractors, project managers and clients on the format and content of O&M manuals that add value and is a “no surprises” approach to avoid disputes after handover.

About OMTRAK

OMTrak is an award winning Internet based system that allows builders, contractors and owners to develop their operations and maintenance manuals online to save time and money.

The system will produce complete electronic O&M Manuals and hard copies as needed.

The benefits include you can progressively load data, have it checked before completion and the Facility Manager is produced with a complete asset schedule for ongoing asset management.

Contact Details

Email contact@omtrak.com

Web www.omtrak.com

¹ Eric Jackson Atlantic Division Naval Facilities Engineering Command 2000 - US Federal Facilities Council Technical Report No. 140

Getting Started?

O&M manuals are usually the last thing considered in the delivery of new works. This is usually driven by the contract and the culture in the construction industry.

The best time to start O&M manuals is around the commencement of the works or when all major service sub contracts are let. This allows contractors, project managers and the client the opportunity to establish the requirements for the O&M manuals up front. Progressive development of the manuals over the duration of the works tends to avoid the usual last minute panic to meet the Contract deadlines and makes for a happy client.

Who should prepare the Manuals?

Often tasking the co-ordination of O&M Manuals is left to a junior staff member. Yet O&M Manuals are important legal documents and will have a lasting impact on the Owner. A senior manager must be tasked with the responsibility to guide the development of the manuals and if needed deal with the more difficult suppliers who see O&M Manuals as a post handover task. Remember your project payments and reduction in security may be at risk here plus the Owner or Facility Manager may not be too impressed with poor levels of documentation.

What are the roles in preparing and finalising the Manuals?

There are three prime roles in the development of O&M Manuals. They are:

- **Contractor** – who creates the information in the Manuals
- **Quality Assurance (Consultants)** – tasked with checking the data to ensure it meets the contract, specifications and legal requirements
- **Client** – the representative who accepts the manuals as finalised

You will need to assign these roles to the projects' sub-contractors, designers, project managers and client representatives. In OMTRAK the process is pre-developed in the QA section and each role is assigned to specific people and or teams and each can record comments or actions required to ensure the Manuals are correct and finalised.

What table of contents should I use?

The following table of contents should be common to all O&M Manuals and is based on AS1388² and Industry Best Practice.

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

Are there any statutory requirements?

In countries like USA, UK, Australia, NZ and elsewhere there are various Acts and / or Regulations which impact upon the content of O&M manuals. In general the relevant areas are:

- Public Health relating to A/C Systems, Legionella control etc
- Environmental, Planning and Building Regulations relating to Essential Services, Life Safety and Fire Systems
- Industrial Regulations relating to Health and Safety at Work

Often these regulations can refer to one or more Industry Standards and Contractors must become familiar with the requirements and local conditions. In most the general principle is to provide adequate information to the owner to safely operate and maintain the new assets

Attachment 1 provides some examples on the statutory and regulatory requirements for O&M Manuals

About Standards and O&M Manuals?

There are thousands of Standards and unfortunately they do not have a convenient cross reference on what is required in O&M Manuals.

You will need to ensure your suppliers have provided the correct information in accord with the relevant standard for their products. As mentioned before some of these Standards have the effect of law and if not followed could expose you and your firm to considerable liability.

Are there any contractual requirements?

Most contracts and specifications have some requirements for the format and content of O&M manuals. Also contracts can have financial penalties or milestones linked to timely delivery of O&M Manuals. These should be checked at the commencement of the contract to ensure that the requirements are met.

You can go to <http://www.webfm.net/contact/> to request a free copy of our standard specification clause for O&M Manuals.

Are there any Environmental (Green) requirements?

Most new projects incorporate some level of environmentally sustainable design (ESD) such as water recycling, heating, shading and cooling systems and integrated energy management.

² AS 1388:1994 Guidelines for technical information for building and construction products (Note no Standard exists for O&M Manuals)

Documentation of the green features and operation should be included in the O&M manual to allow the Owner to meet the annual recertification requirements. In addition to the O&M Manuals a User Guide is promoted by the Green Building Authorities³ to assist users and tenants covering:

- Energy and Environmental Strategies
- Monitoring and Targets
- Building Services
- Transport Facilities
- Materials and Waste Policy
- Expansion or re-fit considerations
- References and Further information

How many Manuals are needed?

The following is a typical set of “trade” package O&M Manuals. They are:

- Electrical
- Hydraulics
- Mechanical
- Fire Systems
- Fabric and Finishes
- FF&E (Furniture, Fixtures & Equipment)
- Lifts and Escalators
- Security and Communications
- Structure
- Civil Works
- Landscaping
- Other (Medical Gases, Specialist Plant etc)

Depending on the “Trade” packages some Contractors may have more than one manual to prepare. For example the Electrician may cover electrical reticulation, lighting plus electrical fire systems (detectors) and security and communications. In this example the Electrician would have 3 O&M Manuals to prepare. Also the Plumber can have both normal hydraulics and “wet” fire systems Manuals.

The above list is not definitive and each project set of Manuals should reflect the works, any major milestones or stages and the appropriate trade break-up.

The key point here is do not assume you are right, consult with the Designers, Facility Manager and Client to confirm the most suitable list and number of manuals.

Are there other Manuals to include

O&M Manuals are increasingly more about the whole project than just the contractor’s responsibility. Owners are now using the O&M’s as a means of capturing critical information about the project. This can include;

• **Approvals Manual** – This can include, Development Approvals/Consents, Environmental Conditions, Planning Authority Approvals, Occupancy Certificates, Road Access Approvals, Utilities Certificates and any other relevant documents.

• **Design Manual** – This can include; Safety in Design Reports, Risk Assessments, Mitigation Strategies and special user instructions relating to e.g maximum capacities, design limitations, operational risks (not addressed in the design),

Owners can now use the O&M’s as a single point of truth for all related documentation for the project. This is especially useful when seeking to sell the development at a later date or to provide a means of systemic knowledge transfer from the Project Team to the Operational Team.

What As-Built documentation is needed?

As-Built documentation can include plans, diagrams, special details and the like. The objective here is to provide the Owner with information that can be used later. Eg the sewer diagrams and plans are important for location and depth of services. Electrical wiring plans and diagrams help in future works or maintenance of the system.

The format of As-Built documents should be electronic to reduce paper consumption and storage needs. All as-built documents should be clearly labeled and marked up as “as-built” or “as constructed” and should not be “for construction” or other terms. The final format of As-built plans etc should be in accord with the Contract, Specification and or Client directions. This will also cover whether documents are in CAD format or PDF.

³ GBCA sect Man-5 of the Office design v2 of the technical manual

A CAD format allows the drawings to be re-used for other design work and need careful specification on the approach to “layering” the designs and “binding” the layers into readable plans. If CAD is required confirm the specific requirements with the Project Manager and or Owner.

A PDF format, however is usually more universally accessible especially for Facility Maintenance Staff who are not always CAD literate. If there is doubt on the correct format then include both CAD files for later use on re-designs and PDF for day to day use by facility staff. Also the PDF is not alterable and in effect acts as the final reference drawing.

What format should I use for the Manuals?

Most Facility Managers and Owners would prefer electronic O&M Manuals to Hard Copy folders. Electronic formats like Word, PDF and the like allow for PC or networked storage and can be accessed relatively easily. Hard Copy Manuals require storage and strict controls on borrowing to prevent loss and not many Facility Managers make good Librarians. Also as most of the information used to develop O&M Manuals is now electronic (Word, Spreadsheet, PDF, Web download, etc) it makes sense to create the Manuals in electronic format.

Is there a “Green” Approach to O&M Manuals?

Electronic O&M Manuals are the “green” approach. With major projects requiring up to 6 copies of O&M Manuals first in draft form for review and checking and then again in final versions it can consume a large amount of paper, in fact an estimate on one project was that electronic O&M Manuals saved approximately ½ tonne of paper or about 9-11 trees.

What electronic formats should I use?

Electronic O&M Manuals can take a number of forms. The following is a short guide on the methods available.

Method	Disadvantages	Advantages
Compile all the various PDF, CAD, Word and scanned image files into one Disk or USB. A heading or table of contents document is required to improve usability and must be included in the DVD/USB	<ul style="list-style-type: none"> No pre-checking of Manual before issue Risk of inconsistent format or missing documents Multiple DVD/s or USB from each Trade to Manage No structured asset data for re-use 	<ul style="list-style-type: none"> Simple approach
Develop and issue a standard template (eg Word) for use by each Trade to prepare their O&M Manuals with added files like as-built documents included in the CD.	<ul style="list-style-type: none"> No pre-checking of Manual before issue Must develop template Trades have different Versions of Word No structured asset data for re-use 	<ul style="list-style-type: none"> Low tech approach Standard format adopted
Take the Hard Copy Manual and have it scanned and converted to PDF images and transfer to a DVD or USB	<ul style="list-style-type: none"> Requires Hard copies and printing No pre-checking of Manual before issue No search function possible on DVD/USB data No structured asset data for re-use Cost of document scanning 	<ul style="list-style-type: none"> Nil
Use the OMTRAK on-line O&M system to create standardised Manuals with all required attached files in fully electronic format	<ul style="list-style-type: none"> Has a fee cost 	<ul style="list-style-type: none"> Can be checked on-line anytime Each Trade completes their own manual All Trade Manuals combined into a single USB, one project = one manual Full electronic format in PDF and structured Database for re-use in asset systems

General Presentation: DVD or USB media should be in a suitable case and labelled showing the project details.

The OMTRAK O&M System is a complete package. It is web based and requires only an internet connection and standard browser. It is pre-formatted to meet your requirements, will allow on-line checking throughout the project, provides a single whole of Project PDF document with all attached files and is a structured asset database as well.

Hard Copy Manuals?

When using the OMTRAK system the formatting of text, line spacing etc is done for you. All you need to do is use the PDF converter and print the downloaded documents from your PC.

Check your specification first to confirm if there are other requirements for hard copy format. In the absence of a specific requirement the following is based generally on AS1388 as a guide to the format and presentation of hard copy manuals:

Generally

- Generally the O&M Manuals must be in a readable and easily accessible format and presentation.
- The use of illustrations and inclusion of relevant reference material is encouraged to ensure the user/reader is able to adequately understand the requirements for safe and proper operation and maintenance of the works.
- The language style used in the document should be appropriate to the user or intended audience

By using the OmTrak system you can save the trees, avoid print costs and wasted time waiting for consultant reviews. The on-line QA process allows real time checking of content and avoids delays at handover.

What Should each Trade Include in the Manuals?

The following checklist provides a basic guide as to what should be included in each Manual.

Heading	Checklist Item	Check
Introduction and scope	Is the description adequate to describe the complete scope of works undertaken?	
	Is there a description of items excluded from the contract scope?	
	Does the description and scope include all contract variations?	
Assets	Is the schedule of assets or equipment adequate to allow maintenance staff to identify, locate and service the plant?	
	Are the schedules complete including Make, Model, Serial numbers, Expected life, Warranty periods, Cost, and Other information, ie performance requirements?	
	Is there sufficient information to meet any Statutory Requirements for the assets, systems and or plant?	
	Has the Owner or Facility Manager been consulted to ensure the level of detail provided meets their needs?	
Maintenance	Are all statutory maintenance schedules included with reference to the appropriate Standards and or Legislation?	
	Are all manufactures recommended maintenance routines included and referenced accordingly?	
	Are the maintenance schedules linked to the assets/equipment schedules to ensure all items are covered in the schedule?	
Operations	Are Operating instructions, minimum skills/knowledge required and procedures clearly described and adequate to allow users to properly and safely access, clean, operate and repair the assets/systems or plant?	
	Are instructions relating to the operation of special "green" systems included, ie multiple and or inter-linked systems, internal thermostatically controlled external sun shades, grey and black water recycling systems?	
	Are there clear and simple instructions for routine and emergency fault and trouble shooting that can be undertaken by the Owner or Facility Manager to minimise failure, injury and or costly callouts?	
Commissioning	Are copies of all commissioning test results included in this section?	
	Are copies of the signed commissioning sheets uploaded as evidence	

Heading	Checklist Item	Check
	Are copies of failed commissioning tests included as evidence of later approval	
Certificates	Are all statutory certificates included, ie Fire Systems, Supply Authorities, Plant Registrations?	
	Are there special certificates required under the contract or regulations	
	Are there any special conditions the owner should be aware of as part of any issued certificate, eg Fire Engineered solutions?	
Warranty	Are the required warranties under the contract uploaded?	
	Are all supplier warranties that exceed the Builders Contract warranty period included?	
	Are there special warranties required under the separate 'Trade' specifications included, like landscaping, Kitchen Equipment, Security Systems etc	
Spare Parts	Does the Spare Parts section include a list of all spares provided under the contract and their storage location?	
	Is the list of spare parts adequate to allow maintenance staff to order replacements for routine tasks?	
	Does the Spare Parts section include a list of all major suppliers contact details for the relevant equipment items?	
Help and contact	Does the Help and Contact list include the prime contractor, main sub-contractor and all specialist contractors for the works?	
	Are all the contact details provided including, firm name, key contact, address, phone/fax, email and web site?	
Drawings and reference	Do all "as-built" plans accurately reflect the works and show sufficient detail to identify and locate all concealed services, all installed items and their configuration	
	Are all as-built drawings properly labelled, marked up as "as-built" and include all required dimensions and details?	
	Are drawings loaded and formatted as PDF and or CAD as required under the contract?	
	Are copies of relevant manufacturers manuals included in this section?	
	Are copies of any schedules of finishes, doors, windows, locks, furniture, fitments, and other elements included in the appropriate manual?	

Attachment 1 – Examples of Requirements for O&M Manuals

Examples include:

Australian Commonwealth Work Health and Safety Act 2011 Division 2—Primary duty of care, 19,3 (f) – which among other things requires provision and maintenance of equipment and structures and any information, training, instruction to protect all persons from risks to their health and safety etc.

In NZ the Health and Safety at Work Act 2015 requires under CI 42 that a supplier must provide information concerning the purpose for each plant, substance or structure, results and any testing, and information, training etc necessary.

In the USA Occupational Safety and Health Act of 1970 (OSH Act) includes regulations for example on the maintenance and certification of Rope Decent Systems with specific requirements for Annual and 10 Year Inspections and certifications. Also the National Fire Protection Association Code NFPA72 requires provision of a set of reproducible as-built installation drawings, operation and maintenance manuals, and a written sequence of operation shall be provided to the building owner.

In the UK under the Health and Safety at Work etc. Act 1974 there is the requirement for provision of such information, instruction, training etc as is necessary.

With fines ranging from thousands to millions for non-compliance owners could be well within their rights to refuse acceptance at handover where the information is deemed inadequate to meet their obligations.

Attachment 2– Essential Fire Safety Measures

The following table lists the essential fire safety measures as listed in the NSW EP&A Regulation 2000. This list is similar in each state however you should refer to the state specific legislation as documented in Attachment 2.

<ul style="list-style-type: none"> • Access Panels, doors and hoppers to fire resisting shafts • Automatic Fail-safe devices (electromagnetic devices) • Automatic Fire Detection and Alarm Systems • Automatic Fire Suppression (sprinkler) Systems • Emergency Lifts • Emergency Lighting • Emergency Warning and Intercommunication Systems • Exit Signs • Fire Alarm Communication Link (connected to NSW Fire Brigades via private monitoring service provider) • Fire Blankets • Fire Control Centres and Rooms • Fire Dampers • Fire Doors (and self-closing devices) • Fire Hydrants • Fire Safety and Emergency Evacuation Procedure • Fire Seals protecting openings in fire-resisting components of the building • Fire Shutters • Fire Windows • Hose Reel Systems 	<ul style="list-style-type: none"> • Lightweight Construction (walls, ceilings, column/beam protection) • Mechanical Air Handling Systems • Perimeter vehicle access for emergency vehicles • Paths of travel for stairways, passageways and ramps • Portable Fire Extinguishers • Pressurising Systems • Required Exit Doors (Exit latches) • Safety Curtains in proscenium openings • Smoke and Heat vents • Smoke control systems • Smoke Dampers • Smoke Detectors and Heat Detectors • Smoke Doors • Solid Core Doors (and self closing devices) • Stand-by Power Systems / Emergency Generator Backup • Wall-wetting Sprinkler and Drencher Systems • Warning and Operational Signs
---	--

About WebFM

Our integrated software and consulting services combine to give builders, owners and facility managers incredible efficiencies and reduced risk. Project handovers become seamless and asset maintenance is future proofed.



Design, Construct & Maintain

OmTrak is cloud based software built for the construction and FM industry. Supported by industry experts.

Document Management
Transmittals, RFIs & Tasks
Design Reports
Operations & Maintenance Manuals
Defects, Snags and Punchlists
BIM Management
Tender Management
Facility Management



The Software Revolutionising Facility Maintenance Forecasting

Asset maintenance planning made simpler and smarter. Generate 1-50 year forward maintenance plans with ease.

- Strategic Asset Management Planning
- Condition Audits
- Forward Life-cycle Forecasting

Do you need more guidance with a construction or FM project?

Our consulting team use innovative methodologies and provide expert advice to solve your asset challenges.