

SECTION 01 17 73: OPERATION & MAINTENANCE MANUALS

1. GENERAL:

- A. This section includes requirements for Contract Record - Operations and Maintenance manuals required prior to project closeout including, but not limited to, the following:
- Equipment Lists
 - Operations and Maintenance Manuals
 - Warranty Information
- B. The following language will be included minimally in the project specification section and supplemental to language normally supplied by the design team. The project team is to modify and/or expand the language as appropriate to the project.
- C. All O&Ms will be submitted electronically in Adobe .pdf format.
- D. Create at least one electronic .pdf file for each CSI division. Where file size does not exceed the size limitation, a single combined .pdf file will also be submitted for the entire O&M manual
- E. No single .pdf file will exceed 60MB in size. If a single CSI division file is greater than the 60MB size limitation, the file must be split into the CSI sub-sections.
- F. Each .pdf file created will be "OCR" keyword-searchable and also have bookmarks for each section, equipment manual/brochure, and other inserts. If the entity responsible for making the O&Ms does not have the in-house capability for creating the OCR searchable .pdf files, they must use AMS Imaging for this work.
- G. The O&M metadata.xls file will be completed with each O&M submittal. The O&M metadata.xls file can be obtained from the Brown project manager. Instructions for completing the metadata information is contained in the workbook.
- H. Assemble a complete electronic operations and maintenance (O&M) manual indicating the operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
- I. Include product data (including final approved submittal data detailing equipment performance data and features) and related information appropriate for the maintenance and operation of all products submitted on and furnished under the contract. System and product data shall be included for all equipment and systems indicated in Section 01 17 72 – Brown Building Equipment Data Sheet.
- J. Produce and submit one draft of the electronic O&M manual to the Director of Maintenance Operations four (4) weeks before substantial completion. The draft O&M submittal shall be reviewed by the Facilities Management Maintenance Operations staff for completeness of content. Any missing or incorrect information shall be corrected by the contractor.
- K. The electronic manual is to include, but is not limited to, the following minimum requirements and table of contents (additional requirements for the O&M may be found in the respective sections):
1. Emergency contact list with contact names and twenty-four (24) hours contact information for use during the guarantee/maintenance period.

2. Project directory with contact information including firm name, contact names, addresses and phone numbers, for the following:
 - owner’s representative
 - architect,
 - design sub-consultants such as mechanical and electrical engineers, contractor, subcontractors
 - vendors and commissioning agents
3. Summary of the scope of work of the project including any changes
4. Schedule summary including start date, completion date, and start and end date of the project guarantee
5. Copy of Certificate of Occupancy (if applicable)
6. Copy of the executed Certificate of Substantial Completion (if applicable).
7. Contractor’s project warranty letter
8. Subcontractor warranty letters.
9. Special guarantees and warranties such as roofing, waterproofing, windows and doors as applicable.
10. The following CSI MasterFormat divisions and sections shall typically be included in the project operations and maintenance manual draft submittal. The project team shall modify or expand this list as appropriate to the project deliverables. Any project deliverable not captured in this list shall be provided under the appropriate CSI MasterFormat division and section.

CSI Division	CSI Section	CSI Division Name
7	1	Operation and Maintenance of Thermal and Moisture Protection
7	6	Schedules for Thermal and Moisture Protection
7	24	Exterior Insulation and Finish Systems
8	1	Operation and Maintenance of Openings
8	1	Operation and Maintenance of Louvers and Vents
8	6	Schedules for Openings
8	41	Entrances and Storefronts
8	42	Entrances
8	50	Windows
8	60	Roof Windows and Skylights
8	70	Hardware
8	80	Glazing
8	90	Louvers and Vents
9	6	Schedules for Finishes
9	30	Tiling
9	63	Masonry Flooring
9	66	Terrazzo Flooring
9	67	Fluid-Applied Flooring
9	75	Stone Facing

CSI Division	CSI Section	CSI Division Name
9	90	Painting and Coating
10	1	Operation and Maintenance of Specialties
10	6	Schedules for Specialties
10	28	Toilet, Bath, and Laundry Accessories
11	1	Operation and Maintenance of Athletic and Recreational Equipment
11	6	Schedules for Athletic and Recreational Equipment
11	12	Parking Key and Card Control Units
11	13	Loading Dock Equipment
11	31	Residential Appliances
11	41	Food Storage Equipment
11	42	Food Preparation Equipment
11	43	Food Delivery Carts and Conveyors
11	44	Food Cooking Equipment
11	46	Food Dispensing Equipment
11	47	Ice Machines
11	48	Cleaning and Disposal Equipment
11	51	Library Equipment
11	52	Audio Visual Equipment
11	53	Laboratory Equipment
11	61	Theater and Stage Equipment
11	66	Gymnasium Dividers
11	66	Athletic Equipment
11	71	Medical Sterilizing Equipment
12	1	Operation and Maintenance of Window Treatments
12	6	Schedules for Furnishings
12	48	Rugs and Mats
13	1	Operation and Maintenance of Special Construction
13	6	Schedules for Special Construction
13	18	Ice Rinks
13	34	Fabricated Engineered Structures
13		Special Construction
14		Conveying Equipment
21		Fire Suppression
22	14	Facility Storm Drainage
22		Plumbing
23	1	Operation and Maintenance of Central Heating Equipment
23	6	Schedules for HVAC
23	9	Instrumentation and Control for HVAC
23	10	Facility Fuel Systems
23	20	HVAC Piping and Pumps

CSI Division	CSI Section	CSI Division Name
23	50	Central Heating Equipment
23	65	Cooling Towers
23		Heating, Ventilating, and Air Conditioning
25	58	Integrated Automation Control of Electronic Safety and Security Systems
25	98	Integrated Automation Control Sequences for Electronic Safety and Security Systems
25		Integrated Automation
26	9	Instrumentation and Control for Electrical Systems
26	30	Facility Electrical Power Generating and Storing Equipment
26	50	Lighting
26		Electrical
28	1	Operation and Maintenance of Electronic Safety and Security
28	6	Schedules for Electronic Access Control and Intrusion Detection
28	13	Access Control
28	30	Electronic Detection and Alarm
28		Electronic Safety and Security
33		Utilities
48		Electrical Power Generation

2. MATERIALS & FINISHES MANUALS:

- A. The materials and finishes information shall include details about products, applied materials and finishes as applicable:
1. Manufacturer's data, giving full information on products:
 - Catalog number, size, and composition
 - Color and texture designations
 - Information required for re-ordering specially-manufactured products
 - Instructions for care and maintenance
 2. Manufacturer's recommendations for types of cleaning agents and methods
 3. Cautions against cleaning agents and methods which are detrimental to the product
 4. Recommended schedule for cleaning and maintenance
 5. Final as-built surfaces and finish schedule, keyed to reduced size floor plans included

3. ROOFING SYSTEMS & BUILDING ENVELOPE MANUALS:

- A. The roofing systems and building envelope information shall include details for architectural products, such as doors and windows, roofing systems, waterproofing membranes and related materials; content to include based on project deliverables, as a minimum the following shall be required:
1. Manufacturer's data or copies of project submittals and shop drawings giving full information on products
 2. Applicable standards
 3. Details of installation
 4. Instructions for inspection, maintenance, and repair

4. EQUIPMENT SPECIFIC MANUALS:

- A. Information submitted shall include the following as applicable:
1. Normal operating characteristics and limiting conditions
 2. Performance curves, engineering data and performance tests including: HVAC system tests and balancing (TAB) reports, motor alignment test etc.
 3. Electrical short circuit studies, circuit protection coordination studies and arc flash studies
 4. Electrical panelboard and switchboard schedules
 5. As installed schedules for lighting fixtures, lamps and ballasts
 6. Nomenclature and catalog number of all replaceable parts
 7. Manufacturer's printed instructions and operating procedures:
 - Start-up, break-in, routine and normal operating instructions
 - Regulation, control, stopping, shut-down and emergency instructions
 - Summer and winter operating instructions
 - Special operating instructions
 8. Maintenance requirements and procedures:
 - Routine operations
 - Guide to "troubleshooting"
 - Illustrations, assembly drawings and diagrams required for maintenance, disassembly, repair and reassembly
 - Alignment, adjusting and checking
 9. Predicted life of parts subject to wear
 10. Recommended spare parts
 11. Maintenance agreements
 12. Servicing and lubrication schedule; list of lubricants required
 13. Equipment wiring and controls diagrams
 14. One line and process flow diagrams submittals for applicable sub-systems:
 - Mechanical (heating, cooling, piping, process water and specialty systems)
 - HVAC (Air handlers, ductwork, piping)
 - Plumbing
 - Electrical (normal, standby power systems and specialty systems)
 - Fire Alarm
 - Security and Telecom
 15. Charts of valve tag numbers, with location and function of each valve
 16. Other data as required under pertinent sections:
 - Fire alarm system information – section 28 31 10
 - Lighting controls information – section 26 50 00 and 26 56 00
 - Grounding and bonding test report – section 26 05 26

5. SYSTEM CONTROLS & SEQUENCE OF OPERATIONS MANUALS:

- A. System controls descriptions for normal operation and failure modes for large or complex systems that are comprised of multiple subsystems (such as building-wide smoke control systems with standby power sources, fire alarm and building automation system interfaces)
- B. Sequence of operations: include description of normal mode sequences and operation in all failure modes
- C. As-built control diagrams and interconnection wiring information
- D. One line and process flow diagrams submittals for applicable sub-systems

6. BUILDING EQUIPMENT LISTS:

- A. The project team shall utilize and complete the standard Building Equipment (section 01_17_72) data sheet template, in electronic Excel spreadsheet format, for all new equipment provided under the project. For renovation projects, include a separate spreadsheet for all equipment removed under the project.
- B. The spreadsheet template includes required equipment specification data as well as information relating to the installed equipment location and building areas served by the equipment. This document also details the equipment type descriptions and keywords for use in the University's Facility Asset Management Information System (FAMIS).
- C. At the time of delivery of the O&M manual the equipment list shall be updated with the as built information and included with the O&M delivery

D. DESIGN PHASE:

- 1. During the design phase, the project design team shall utilize and fill out the building equipment data sheet template, identifying and labeling all referenced equipment, equipment locations and other equipment reference data. The Microsoft Excel based version of the building equipment data sheet will create the required equipment tag numbers for all equipment and shall be filled out in coordination with record drawing version equipment nomenclature. Each equipment item shall be assigned a unique identification tag which is easily merged with existing equipment identifiers in the same building; generic common equipment designations are not acceptable.
- 2. A completed draft Brown building equipment data sheet Excel file for both new equipment and equipment to be removed shall be project deliverables, for completion by the contractor during construction.

E. CONSTRUCTION PHASE:

- 1. During the project design phase the Engineer of Record shall utilize the Brown building equipment data sheet for identification of equipment to be removed from service. The building equipment data sheet shall also be completed with the initial information for all new equipment to be installed during the project.
- 2. During the construction phase, the general contractor shall utilize the Brown building equipment data sheet for updates to the list of equipment being removed and added, and shall be responsible for completion of all remaining data sheet information.