SECTION 01 78 23

OPERATION AND MAINTENANCE MANUAL

PART 1 GENERAL

1. SECTION INCLUDES
   1. Format and content of Operation and Maintenance (O&M) Manuals.
   2. Requirements for training of Owner personnel.
   3. Schedule of deliverables.
2. RELATED REQUIREMENTS
   1. The following sections contain related requirements:
      1. Section 01 33 23 - Submittals
      2. Section 01 77 19 - Contract Closeout
      3. Section 01 78 39 - Project Record Documents
      4. Specific product, equipment, and assembly technical sections.
      5. **[Add other sections as identified by LEED certification requirements]**
   2. Refer to ASHRAE Guideline 4 current edition for standard of care and definitions.
3. GENERAL REQUIREMENTS
   1. The O&M Manuals shall be organized as a practical, actionable guide to achieve the following:
      1. Provide instructions for the safe, efficient, and sustainable use of the facility, system(s), and component(s).
      2. Provide the basis for training Owner personnel.
      3. Provide the basis for establishing maintenance programs for optimal system(s) and component(s) lifecycle.
      4. Provide the technical information required for the maintenance, repair, etc. of system(s) and component(s).
      5. Provide a record of as-installed setpoints, sequences, and operating conditions of system(s) and component(s).
   2. The following items are not to be included in the O&M Manual:
      1. Warranties. See Specification Section 01 77 19 – Contract Closeout
      2. Testing, Adjusting, and Balancing Report(s)
4. O&M MANUAL CONTENTS
   1. Each O&M Manual shall include the following tabs:
      1. Table of Contents Tab
         1. Include all tab and section information.
      2. Project Information Tab
         1. UI Construction Manager’s name
         2. Design Professional and Professional Consultant names, addresses, and telephone numbers
         3. Contractor’s name, address, and telephone numbers
         4. Subcontractors List
      3. Warranty Summary Tab:
         1. Provide a list of all extended warranties. Refer to Specification Section 01 77 19 – Contract Closeout for format requirements.
         2. Copies of the warranties shall be submitted per Specification Section 01 77 19 – Contract Closeout.
      4. System and Component Tab (Multiple tabs):

***[NOTES TO DESIGN PROFESSIONAL:***

***Edit this list with review by Project Manager and Engineering Services to establish systems and components to be included in the O&M Manual and the specific training requirements for each.***

***Include CSI Division reference for each selected system and/or component. Do not rely solely on CSI Specification Numbers (08 11 13) or project specific equipment names (HX-1) for identification.]***

* + - 1. Arrange contents by building system(s) and component(s). At a minimum provide an individual tab for each system and component identified in this Section.
      2. The following system(s) and component(s) shall each have an individual tab within the O&M Manual. Owner may edit list based upon submittals and approval of system(s) and component(s):
         1. **Section ## ## ## - Interior Finishes, including Final Finish Schedule**
         2. **Section ## ## ## - Ceiling Systems**
         3. **Section ## ## ## - Flooring Systems**
         4. **Section ## ## ## - Exterior Finishes, including Final Finish Schedule**
         5. **Section ## ## ## - Casework and Furniture**
         6. **Section ## ## ## - Roofing Systems, including Leak Detection Systems**
         7. **Section ## ## ## - Firestopping Systems**
         8. **Section ## ## ## - Doors and Hardware**
         9. **Section ## ## ## - Windows and Operable Shades**
         10. **Section ## ## ## - Glazing Systems**
         11. **Section ## ## ## - Skylight/Sloped Glazing Systems**
         12. **Section ## ## ## - Overhead Coiling Doors and Controls**
         13. **Section ## ## ## - Flooring Systems**
         14. **Section ## ## ## - Loading Dock Accessories**
         15. **Section ## ## ## - Platforms and Lifts**
         16. **Section ## ## ## - Elevators & Escalators**
         17. **Section ## ## ## - Fire Suppression Systems and Fire Pumps**
         18. **Section ## ## ## - Water Fountains and Central Water Fountain Systems, Controls, and Pumps**
         19. **Section ## ## ## - Irrigation Systems**
         20. **Section ## ## ## - Sump and Ejector Pumps and Controls**
         21. **Section ## ## ## - Compressed Air Systems, including process air, systems/lab air, and any control air system or pneumatic control air.**
         22. **Section ## ## ## - Domestic Water Pumps, Softeners, and Filtration**
         23. **Section ## ## ## - Domestic Water Heaters and Controls**
         24. **Section ## ## ## - Specialty Plumbing Fixtures and Trim such as hands free faucets/controls/batteries**
         25. **Section ## ## ## - Building Controls including component locations**
         26. **Section ## ## ## - Hydronic Pumps**
         27. **Section ## ## ## - Hydronic Heat Exchangers, Filtration, and Chemical Feed Systems**
         28. **Section ## ## ## - In-Slab Hydronic Systems**
         29. **Section ## ## ## - Snow Melt and Glycol systems**
         30. **Section ## ## ## - Fire Dampers/Smoke Evacuation Systems**
         31. **Section ## ## ## - Fan Coil Units**
         32. **Section ## ## ## - Central vacuum pump systems and Controls**
         33. **Section ## ## ## - Chilled Water and Off-Season Chilled Water Systems**
         34. **Section ## ## ## - Deionizing or RO Water Systems**
         35. **Section ## ## ## - Boilers and Controls**
         36. **Section ## ## ## - Steam Systems and Specialty Steam Equipment**
         37. **Section ## ## ## - Air Curtains**
         38. **Section ## ## ## - Exhaust Fans including HVAC, Kitchen and Restroom Systems**
         39. **Section ## ## ## - Air Handling Systems**
         40. **Section ## ## ## - Specialized ventilations systems such as Art/Archive Storage, Processing, or Environmental Safety Systems.**
         41. **Section ## ## ## - Humidification or Dehumidification Systems and Controls**
         42. **Section ## ## ## - Overcurrent Coordination, Arch Flash, Short Circuit Studies**
         43. **Section ## ## ## - Electrical Power Monitoring**
         44. **Section ## ## ## - Occupancy Sensors for lighting and HVAC controls**
         45. **Section ## ## ## - Lighting Fixtures**
         46. **Section ## ## ## - Lighting Controls, Daylight Harvesting and Dimming Systems**
         47. **Section ## ## ## - Emergency Power Systems including Generators, controls and transfer gear.**
         48. **Section ## ## ## - Access Controls**
         49. **Section ## ## ## - Fire Alarm, Detection and Sampling Systems**
         50. **Section ## ## ## - Utilities – Mechanical Systems and Distribution**
         51. **Section ## ## ## - Utilities – Electrical Systems and Distribution**
         52. **Section ## ## ## - Other**

1. SYSTEM AND COMPONENT TAB CONTENTS
   1. Each system and component tab shall be organized and arranged as outlined below.
      1. General Information Section
         1. System and component designation (as per Contract Documents).
         2. Component (product) CSI specification number.
         3. Component (product) nameplate data:
2. Manufacturer
3. Model number
4. Serial number
5. Size
6. Horsepower
7. Voltage and amperage
   * + 1. Location within facility (i.e. room).
       2. Installing contractor contact information with phone number.
       3. Emergency or service contact Information with phone number.
       4. Customer service and parts contact information with phone number and website.
     1. Sequence of Operations Section
        1. As-built (as-installed) narratives and sequence of operations for:
           1. Normal/auto operations mode
           2. Manual/non-auto operations mode
           3. Fail/emergency operations mode
        2. As-built Control(s) diagrams.
     2. Testing and Training Section
        1. Manufacturer’s Startup Report(s).
        2. Functional Test Reports.
        3. Training Materials.
     3. Component (Product) and Operations Information Section
        1. Manufacturer’s installation instructions.
        2. Manufacturer’s startup and troubleshooting instructions.
        3. Manufacturer’s technical instructions.
        4. Manufacturer’s operations instructions.
        5. Parts list (Special tools and maintenance equipment).
        6. Wiring diagrams (if applicable).
        7. Valve Schedule
     4. Maintenance Information Section
        1. Preventative maintenance schedule recommendations.
        2. Manufacturer’s lubrication schedule and list of acceptable lubricants.
        3. Manufacturer’s care and cleaning instructions.
8. O&M MANUAL FORMAT **[UIHC prefers Electronic O&M Manuals]**
   1. Hard Copy Format
      1. Hard Copy Format O&M Manuals shall be bound using heavy duty, D-ring binders, maximum size 3”.
      2. Each binder shall be identified on the front and spine with the following:
         1. University of Iowa Project Number - Project Name
         2. OPERATION AND MAINTENANCE MANUAL
         3. Volume # of #
      3. O&M Manual page sizes may be 8.5” x 11” or 11” x 17”. Oversized drawings shall be inserted into punched vinyl pockets when necessary.
   2. Electronic Format
      1. Electronic file shall be searchable, fully bookmarked .pdf.
         1. Bookmark the .pdf file by tabs listed under Section 1.4 and sub-bookmark system and component tab by section as listed under Section 1.5.
      2. File name shall be as follows:
         1. Owner Project No.-Company Name-O&M Manual-Vol#of#
         2. Example: 214-036-Acme Contractors-O&M Manual-Vol1of3.pdf
9. O&M MANUAL DELIVERABLES
   1. 50% Construction O&M Manual Deliverable:
      1. The Contractor shall submit to the Design Professional **[one (1) electronic or one (1) hard copy]** of the 50% Construction O&M Manual(s) prior to submission of its pay application requesting payment of 50% of the Contract value or more.
      2. Payments beyond 50% of the contract amount may be withheld until the 50% Construction O&M Manuals are reviewed and accepted.
      3. The requirements for the 50% Construction O&M Manual deliverable shall be as follows:
         1. Table of contents tab complete.
         2. Project information tab complete.
         3. Warranty Summary
         4. System and component tab(s)
            1. Article 1.5, Section 1 complete
            2. Article 1.5, Section 4 complete
            3. Article 1.5, Section 5 complete
   2. Training O&M Manual Deliverable:
      1. The Contractor shall submit to the Design Professional **[one (1) electronic or one (1) hard copy]** of the Training O&M Manual(s) prior to Owner training.
      2. The requirements for the Training O&M Manual deliverable shall be as follows:
         1. Table of contents tab complete.
         2. Project information tab complete.
         3. Warranty Summary
         4. System and component tab(s)
            1. Article 1.5, Section 1 complete
            2. Article 1.5, Section 3 complete
            3. Article 1.5, Section 4 complete
            4. Article 1.5, Section 5 complete
   3. Final O&M Manual Deliverable:
      1. The Contractor shall submit **[one (1) electronic and]** three (3) hard copies of the Final O&M Manual to Design Professional for review and comment prior to Final Completion.
      2. The requirements for the Final O&M Manual deliverable shall be as follows:
         1. Table of contents tab complete.
         2. Project information tab complete.
         3. Warranty Summary complete.
         4. System and component tab(s)
            1. Article 1.5, Section 1 complete
            2. Article 1.5, Section 2 complete
            3. Article 1.5, Section 3 complete
            4. Article 1.5, Section 4 complete
            5. Article 1.5, Section 5 complete
      3. The Contractor shall submit one (1) copy of AutoCAD/Visio editable files for all "Construction Record" control as-built drawings indicated below:
         1. Control drawings with detailed piping and wiring diagrams, bill of material and Sequence of Operation for each system, including interfaces with equipment manufacturers, and other suppliers of equipment and systems.
         2. I/O panel layouts and terminations along with interface panel drawings.
         3. Valve and Damper Schedules showing size configuration, capacity, failure position and location of all equipment.
         4. Individual data sheets for each control and automation system components.
         5. Termination and Ladder wiring diagrams.
         6. Small-scale site and equipment plans showing the control component locations in occupied space, equipment rooms, mechanical equipment, etc.
10. TRAINING OF OWNER’S PERSONNEL
    1. Scheduling and Coordination:
       1. All training shall be completed prior to Substantial Completion.
       2. Submit proposed training schedule to Owner’s Representative a minimum of **[60 or 90]** Days prior to Substantial Completion. Contractor’s proposed training schedule shall include the following:
          1. Proposed dates for training by system and component.
          2. Location of the training; classroom or onsite.
          3. Name and role of trainer.
          4. Detailed agenda for session(s)
          5. Draft of training materials including an outline of the specific skills or knowledge the Owner’s Personnel is expected to master.
       3. Training schedule shall be adjusted as required to minimize disruption to Owner’s operations. Provide training sessions outside of normal working hours as required for Owner’s personnel.
    2. Training Content:
       1. Refer to technical specification sections for additional training requirements.
       2. Training O&M Manual shall be used as the basis for instruction.
       3. By Substantial Completion provide the Owner all specialty tools, keys, pass codes, or other items required for the operation or maintenance of system(s) and component(s).
       4. Each training session shall include a thorough review of the following, as applicable:
          1. General Information Section, Section 1.5
          2. Operations Information
             1. Overview of system(s) and component(s) including primary and secondary functions, as-built sequence of operations, area served, and system limitations.
             2. Standard operating procedures for

Normal system(s) and component(s) startup and shutdown.

Normal, manual, and automatic operations.

Seasonal, intermittent, or non-occupied operations.

Emergency or failure conditions including the meaning of warning, trouble, and error messages.

* + - * 1. Special tools and maintenance equipment.
        2. Startup and troubleshooting instructions.
      1. Maintenance Information
         1. Maintenance Information Section, Section 1.5
         2. Component access.
         3. Alignment, tension, vibration, and noise criteria and adjustments.

**END OF SECTION**