

**Part 1 General**

**1.1 SECTION INCLUDES**

- .1 Requirements and procedures for final control diagrams and operation and maintenance (O&M) manual, for building Energy Monitoring and Control System (EMCS) Work.

**1.2 RELATED SECTIONS**

- .1 Section 25 05 01 - EMCS: General Requirements.
- .2 Section 25 05 02 - EMCS: Submittals and Review Process.
- .3 Section 25 01 11 - EMCS: Start-up, Verification and Commissioning.

**1.3 PROJECT RECORD DOCUMENT**

- .1 Submit in accordance with Section 01 78 00 – Closeout Submittals and 21 05 01 – Common Work Results.
- .2 Upon completion of installation, submit three copies of record (as-built) documents. The documents shall be submitted for approval prior to final completion and shall include:
  - .1 Project Record Drawings. These shall be as-built versions of the submittal shop drawings. One set of electronic files including DXF drawing files also shall be provided. Provide on a DVD, USB or SD Media Card.
  - .2 Testing and Commissioning Reports and Checklists. Completed versions of all reports and checklists, along with all trend logs, used to meet the requirements of Section 25 01 11 Part 1.8 - Control System Demonstration and Acceptance.
- .3 Operation and Maintenance (O & M) Manual. This shall include as-built versions of the submittal product data. In addition to the information required for submittals, the Operations and Maintenance Manual shall include:
  - .1 Contractor to provide names, addresses and 24-hour telephone numbers of all installation contractors, equipment suppliers and service representatives.
  - .2 Operators Manual with procedures for operating the control systems, including logging on/off , alarm handling, producing point/object reports, trending data, overriding computer control, and changing setpoints and other variables.
  - .3 **One set** of Programming Manuals with a description of the programming language (including syntax), statement descriptions (including algorithms and calculations used), point/object database creation and modification, program creation and modification, and use of the editor.
  - .4 Engineering, Installation, and Maintenance Manual (s) that explain how to design and install new points/objects, panels, and other hardware; preventive maintenance and calibration procedures; how to debug hardware problems; and how to repair or replace hardware.
  - .5 A listing and documentation of all custom software created using the programming language, including the setpoints, tuning parameters, and object database. One set of magnetic/optical media containing files of the software and database also shall be provided.

- .6 One set of files containing all colour graphic screens created for the project.
- .7 A list of recommended spare parts with part numbers and suppliers.
- .8 Complete original issue documentation, installation, and maintenance information for all third-party hardware provided, including computer equipment and sensors.
- .9 Complete original media source for all software provided, including operating systems, programming language, operator workstation software, and graphics software.
- .10 Licenses, guarantee, and warranty documents for all equipment and systems.
- .11 Recommended preventive maintenance procedures for all system components, including a schedule of tasks inspection, cleaning, calibration, etc.), time between tasks, and task descriptions.
- .12 System Drawings: **Include all system as-built line drawings showing interconnections of EMCS system hardware components and system layouts. Layouts to show sensor locations, valves, dampers, fans and heating/cooling control valves as per point list. Manuals are to include floor plan layouts for each building.**  
  
**Floor plans are to indicate location of all components (i.e. DDC Panels, Hydronic heater valves, duct dampers (outside mech. Room) sensors, exhaust fans, contactors, transducers, timers, etc. in addition to all built-up systems, indicated in block form (i.e. HRV, AHU, A/C unit, boilers, etc.) under EMCS control. Include routing of all network control wiring and major control wiring runs. Floor plan layouts are to be in AutoCAD format. Submit on 11 x 17" size for including in manual. All items on floor plans are to be labelled and all rooms to be numbered as per EMCS tender document sketches. Manuals shall include EMCS as-built control wiring schematics.**

**Part 2 Products**  
**2.1 NOT USED**  
.1 Not Used.

**Part 3 Execution**  
**3.1 NOT USED**  
.1 Not Used.

END OF SECTION