

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Requirements and formats for Operation and Maintenance Data Manual (O&M).

1.2 RELATED SECTIONS

- A. Section 01 33 00 – Submittal Procedures
- B. Section 01 77 00 – Closeout Procedures
- C. Section 01 78 36 – Warranties

1.3 OPERATION AND MAINTENANCE DATA REQUIREMENTS

- A. The Contractor shall submit in the format specified herein, a complete package for Operation and Maintenance Data (O&M Manual), to include instruction manuals for installation, operation, maintenance, and lubrication requirements for each component of mechanical, electrical, irrigation equipment, or other equipment and systems.
- B. The Contractor shall inform all equipment manufacturers and subcontractors of these requirements and ensure that all associated costs are included in the costs for furnishing the equipment or system.
- C. The Contractor shall submit plan view drawings to scale to show the as-built layout of work for irrigation work, mechanical, work, electrical work and/or as required by specifications.

1.4 SUBMITTAL AND SCHEDULING REQUIREMENTS

- A. Schedule Requirements: The Contractor shall include in the submittal schedule each submittal listed herein in accordance with Section 01 33 00, paragraph 1.4.
- B. Preliminary Submittal: The Contractor shall submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. City Representative will review draft and return one copy with comments, in accordance with Section 01 33 00.
- C. Substantial Completion Submittal: The Contractor shall submit two copies of final O&M manual of the hard copy and the electronic copy as described herein. City Representative will review draft and return one copy with comments, in accordance with Section 01 33 00.
- D. Final Completion Submittal: As a requirement of the project closeout and prior to request for final payment, the Contractor shall submit approved 6 copies of the O & M manual 15 days prior to Final Completion, as described herein.

1.5 ELECTRONIC FORMAT

- A. O & M Manual Text and Manufacturers Data
 - 1. Prepare data in the form of an instructional manual.
 - 2. Scan material as required into a PDF file format, to a minimum of 400 DPI and save to CD or DVD.
 - 3. Organize data on a disk, in a manner similar to the hard copy of a binder, using a table of contents and folders for each component of mechanical, electrical, irrigation equipment, or other equipment and systems. Organize information related to each component within that folder.
 - 4. The CD shall be placed in a jewel case with a label indicating Project Name, Contract Number, "Operations and Data Manual 1 OF X", and Date.
 - 5. The Contractor shall submit (6) copies of the CD/DVD and originals as part of Closeout procedures as specified in Section 01 77 00.
- B. O & M Manual drawings and/or diagrams
 - 1. Each drawing shall be color scanned, 400 DPI, and saved to a CD.
 - 2. Each pdf file shall be numbered with prefix "SHT-01-" followed by the drawing number.
 - 3. The CD shall be placed in a jewel case with a label indicating Project Name, Contract Number, "Operations and Data Manual 2 OF X", and Date.
 - 4. The Contractor shall submit (6) copies of the CD and original drawings as part of Closeout procedures as specified in Section 01 77 00.

1.6 HARD COPY FORMAT

- A. O & M Manual Text and Manufacturers Data
 - 1. Prepare data in the form of an instructional manual.
 - 2. Binders: Commercial quality, 8-1/2 x 11 inch three-ring binders with hardback, cleanable, plastic covers; one-inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
 - 3. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; list title of Project; identify subject matter of contents.
 - 4. Arrange content by systems under section numbers and sequence of Table of Contents of this Project Manual.
 - 5. Provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
 - 6. Text: Manufacturer's printed data, or typewritten data on white bond paper.
 - 7. The Contractor shall submit (6) copies of the binders and originals as part of Closeout procedures as specified in Section 01 77 00.
- B. O & M Manual Text As built drawings and/or diagrams
 - 1. Submit copies of each drawing.
 - 2. Drawings shall be printed on bond paper, in full color to scale and shall be folded and included with sleeved folder in binder.
 - 3. The Contractor shall submit (6) copies of the binders and originals as part of Closeout procedures as specified in Section 01 77 00.

1.7 CONTENTS, EACH VOLUME

- A. Table of Contents: Provide title of Project; names, addresses, and telephone numbers of Engineer, sub consultants, and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.
- B. For Each Product or System: List names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
- C. Product Data: Mark each sheet clearly to identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- D. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
- E. Type Text: As required to supplement product data.
- F. Warranties: Bind in a hard copy of each and scan a pdf for the electronic format, refer to Section 01 78 36.
- G. Each instruction manual shall include, but not be limited to, the following:
 - 1. Detailed description of the function of each principal component of the system
 - 2. Performance and nameplate data
 - 3. Installation instructions
 - 4. Procedure for start-up and break-in
 - 5. Proper adjustment
 - 6. Test procedures
 - 7. Procedure for operating
 - 8. Shutdown instructions
 - 9. Emergency operating instructions and troubleshooting guide
 - 10. Safety precautions
 - 11. Complete nomenclature and commercial number of replaceable parts.
 - 12. Panel board Circuit Directories: Provide electrical service characteristics, controls, and communications.
 - 13. Include color coded wiring diagrams as installed.
 - 14. Maintenance Requirements: Include routine procedures and guide for disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
 - 15. Provide servicing and lubrication schedule, and list of lubricants required.
 - 16. Include written sequence of operation by controls manufacturer.
 - 17. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
 - 18. Provide control diagrams by controls manufacturer as installed.
 - 19. Provide Contractor's coordination drawings, with color coded piping diagrams as installed.
 - 20. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
 - 21. Include test and balancing reports as specified in Technical Sections.
 - 22. Additional Requirements: As specified in individual product specification Sections.
 - 23. Provide a listing in Table of Contents for design data, with tabbed fly sheet and

space for insertion of data.

1.8 INSTRUCTION OF CITY PERSONNEL

- A. Before final inspection, provide detailed instructions to the City's designated personnel in operation, adjustment, and maintenance of products, equipment, and systems, at agreed upon times.
- B. Sales representatives shall not conduct the training sessions. Submit a brief description of the qualifications of the manufacturer's representative designated to conduct this training. The manufacturer's representative shall be a factory trained or manufacturer's certified individual with substantial experience in the repair and servicing of the equipment to be covered during the training session.
- C. The City shall receive a six hundred (\$600.00) dollar per day credit from the Contractor for any training that is not conducted in accordance with the requirements of Paragraph A above or as required in the individual technical specification sections. The Contractor and the City Representative will jointly verify that the required training is conducted.
- D. For equipment requiring seasonal operation, perform instructions for other seasons within six months.
- E. Use operation and maintenance manuals as basis for instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.
- F. The training shall cover a thorough discussion of the O&M manual. The training shall include but not be limited to, operation and maintenance of the specific equipment and systems installed, telltale signs of equipment malfunctioning and their solutions, other pertinent topics that relate to optimum system operation and energy conservation.
- G. Prepare and insert additional data in Operation and Maintenance manual when need for such data becomes apparent during instruction.
- H. System Familiarization Training shall follow the outline below:
 - 1. Show location of catalogs, parts lists, drawings and other pertinent material in the part files and O&M manuals.
 - 2. Check out the installation of the specific equipment items.
 - 3. Demonstrate the unit and show that all parts of the Specifications are met.
 - 4. Answer questions.
- I. Safety Training shall cover the following:
 - 1. Point out safety references.
 - 2. Discuss proper precautions around equipment.
- J. Operational Training shall cover the following:
 - 1. Point out reference literature.
 - 2. Explain all modes of operation, including emergency.
 - 3. Check out operators in proper use of the equipment.
- K. Preventive Maintenance (PM) Training shall cover the following items:
 - 1. Pass out PM list including:
 - a. Reference material.
 - b. Daily, weekly, monthly, quarterly, semi-annual, and annual maintenance and inspection procedures.
 - 2. Show how to perform PM jobs.

3. Show operators what to look for as indicators of equipment problems.
- L. Corrective Maintenance Training shall cover the following items:
 1. List possible problems.
 2. Discuss repairs--point out special problems.
 3. Open up equipment and demonstrate procedures, where practical.
- M. Availability of Parts, Outside Service and Manufacturer's Representative
 1. Show how to use parts list and order parts.
 2. Where to order parts: Name, address, telephone.
 3. Check over spare parts on hand. Make recommendations for additional spare parts needed. Sign off their acceptance of the spare parts in the presence of the City's representative.
 4. How to get emergency service help.

1.9 TRAINING SCHEDULES AND PROCEDURE

- A. The Contractor shall designate and provide one or more persons to be responsible for coordinating and expediting Contractor's training duties. The person or persons shall be present at all training coordination meetings with the City.
- B. The Contractor shall submit to the City a Training Schedule, to be used by the City for scheduling the training of City operating personnel by equipment manufacturers. This schedule shall list the estimated completion dates for the installation of all equipment and systems requiring the services of manufacturers' representatives, as stated in the Technical Specifications.
- C. The Contractor shall coordinate the pre-startup training periods with City operating personnel and manufacturers' representatives. All pre-startup training shall be completed 14 days prior to actual Startup. Training services shall be at such times as requested by the City.
- D. The City reserves the right to make video recordings of any of the manufacturer's training sessions for use in ongoing training programs.
- E. Where post-startup training is called for in the Technical Specifications, the Contractor shall supply and coordinate the specified manufacturers' services and Contractor personnel for post-startup training of the City's operating personnel.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION