

**OPERATIONS AND MAINTENANCE DATA AND MANUALS**  
**SECTION 01730**

**PART 1 - GENERAL**

**1.01 SUMMARY**

A. This Section includes provisions for Contractor provided operations and maintenance data and manuals.

B. Work percent completion milestones identified in this Section shall be defined for each reservoir site, Phase 1 Work. Phase 2 Work and Phase 3 Work shall not be considered in determining the Work percentage completion.

C. Operations and maintenance data and manuals shall be submitted for each reservoir site.

**1.02 SUBMITTALS**

A. Submittals shall be made in accordance with Specifications Section 01300, Submittals, and the following special provisions provided herein.

B. The Contractor submittals shall conform to the following provisions:

1. Two complete sets of technical manuals shall be submitted in draft form to the District Engineer not later than the date of the Contractor's partial payment estimate indicates the Work at each site is 75% complete.
2. After the draft technical manuals have been approved by the District Engineer, (10) complete sets of the technical manuals shall be submitted in final form to the District Engineer not later than the 90% of construction completion point.
3. Failure to submit the draft technical manuals by the 75% construction completion point or failure to have the manuals complete in final form by the 90% completion point shall be sufficient justification for the District Engineer to find the Contractor has failed to comply with the intent of the Contract and to therefore reduce partial payment estimates in accordance with the Payment Schedule.

**1.03 FORMAT OF MANUALS**

A. The set of manuals to be provided shall be for each unique reservoir site.

B. Manuals shall be organized into volumes of manageable size that can be readily transported by hand. Where practicable, instructions for similar equipment shall be assembled into a single binder.

C. Form of Manuals

1. Binding and Labeling

- a. Binders for each manual shall be heavy-duty, 3-ring, loose-leaf and shall have dimensions necessary to accommodate contents and 8½-inch by 11-inch paper. The binder spine shall have a clear plastic sleeve to insert binder titles or other identifying information.

- b. When 2 or more binders are necessary, each binder shall be clearly identified with a volume number. Each binder shall be identified on the front and spine with the typed or printed title, "Operations and Maintenance Manual," together with the site name.
  - c. Dividers with tabs shall be provided for each section. Each tab shall be marked with the section number and title.
  - d. Clear plastic pocket sheets shall be provided to receive small items or large folded drawings.
  - e. Software diskettes included with the manuals shall have protective transparent plastic jackets specifically designed to enclose and protect the diskettes.
2. Text Material: When written material is required as part of the manual, the manufacturer's standard printed material may be used, or typewritten text shall be printed on 8½-inch by 11-inch white bond paper.
  3. Drawings: When practical, drawings required as part of the manual shall be bound with the text. Punched holes on drawings shall be reinforced to prevent tearing.
    - a. When oversize drawings are necessary, the drawings shall be folded to 8½-inch by 11-inch and used as foldouts. Foldouts shall be inserted in the 3-ring binder together with text pages.
    - b. If a drawing is too large to be used as a foldout, the drawing shall be neatly folded and placed in a clear plastic pocket and collated as closely as possible with the related text. A reference indicating the drawing title, description of contents, and drawing location shall be inserted at the appropriate location in the text of the manual. A label indicating the drawing number and title shall be affixed to the plastic pocket.

#### **1.04 OPERATIONS AND MAINTENANCE MANUALS**

A. Operations and Maintenance Manuals shall be provided for all operations apparatus and equipment furnished under this Contract. Operations and maintenance manuals shall include the contents identified herein and the information required by the individual specification sections.

B. Manuals shall contain full information for each item of equipment including instructions for installation, start-up, operation, inspection and maintenance, lubrication schedules, parts lists, control or power circuitry, and other pertinent data as applicable. If literature covers more than one model, the Contractor shall neatly identify appropriate provisions.

C. Manuals shall include:

1. Title Page: A title page with the following information shall be provided as the first sheet of each manual or each volume of a multi-volume manual.
  - a. Project title and site name
  - b. Name and address of the project site
  - c. Date of submittal

- d. Name, address, and telephone number of the Contractor
  - e. Name, address, and telephone number of the manufacturer's representative
  - f. Cross-reference to related systems in other operations and maintenance manuals or sections within the same manual
2. Table of Contents
- a. After the title page, a table of contents shall be included for each volume.
  - b. Where more than one volume is required to accommodate the data for a particular system, a summarized table of contents for all volumes shall be provided in each volume of the set.
3. General Information: A general information section shall be provided immediately following the table of contents, with a list, by product name, of each product included in the manual. Under each product, the name, address, and telephone number shall be listed for the subcontractor or installer.
4. Contents of the Manual: In each manual, the following information shall be included for each major component of the equipment and controls.
- a. List of all equipment furnished for project with names, addresses, contact persons and telephone numbers of manufacturer, nearest representative of manufacturer and nearest supplier of manufacturer's equipment and parts.
  - b. General system or equipment description
  - c. Design factors and assumptions
  - d. Reproducible prints of shop drawings including diagrams, wiring diagrams, and schematics, as required under the electrical and instrumentation portions of these specifications.
  - e. System or equipment identification, including:
    - 1. Name of manufacturer
    - 2. Model number
    - 3. Serial number of each component
  - f. Operation instructions. These instructions shall include equipment manufacturer's recommended step-by-step procedures for starting, operating, and stopping the equipment under all modes of operation including emergency operation.
  - g. Tabulation of proper settings for valves and related equipment-protection devices
  - h. Emergency instructions
  - i. Wiring diagrams
  - j. Listing of relay, time delay, switch, and alarm contact settings
  - k. Inspection and test procedures
  - l. Special tools, accessories, or instrumentation operation, testing, or servicing of the equipment needed for proper

- m. Preventive maintenance procedures and schedules
- n. Precautions against improper use and maintenance
- o. Lubrication schedules, including:
  - 1. Lubricant grade and type
  - 2. Temperature range of lubricants
  - 3. Frequency of required lubrication
- p. Complete parts list by generic title and identification serial number, with exploded views of each assembly. The manufacturer's recommended spare parts listing annotated with indications of parts furnished as part of this contract shall be included. This list shall include the manufacturer's recommendations for number of parts which should be stored by VCMWD.
  - 1. Name and location of nearest supplier and spare parts warehouse
  - 2. Sources of required maintenance materials and related service
  - 3. List of all fuses, lamps, seals and other expendable equipment and devices. Specify size, type and order description. List name, addresses and telephone number of vendor.
- q. Recommended troubleshooting and startup procedures. These instructions shall include equipment manufacturer's recommendation regarding installation, adjustment, calibration and troubleshooting
- r. Disassembly and reassembly instructions.
- s. Repair instructions
  - 1. Product Data: Where manufacturer's standard printed data is included in the manuals, only the sheets that are pertinent to the part or product installed shall be inserted. Each sheet shall be marked to identify the part or product included in the installation. Where more than one item is included in a tabular format, each item shall be identified using appropriate references from the Contract Documents. Data that is applicable to the installation shall be identified, and references to information that is not applicable shall be deleted or clearly marked out.
  - 2. The text shall be organized in a consistent format under separate headings for different procedures. A logical sequence of instructions shall be provided for each operations and maintenance procedure.
  - 3. Drawings: Specially prepared drawings shall be provided where necessary to supplement manufacturer's printed data to illustrate the relationship of component parts of equipment or systems.
  - 4. Control or Flow Diagrams: Control and flow diagrams shall be coordinated with information contained in the shop drawings to ensure correct illustration of the completed installation.
  - 5. Warranties and Service Contracts: When the specifications require a separate warranty or service contract for an item of equipment or a

particular portion of the project, a copy of the warranty or service contract shall be included in the manual. The warranties for equipment or equipment components shall be listed and terms and conditions described. Servicing and safety precautions prescribed by the manufacturer to keep warranties in force shall be described. Written procedures to be followed in the event of product failure shall be provided. Circumstances and conditions that affect validity of the warranty or bond shall be included.

## **1.05 EQUIPMENT AND SYSTEMS MAINTENANCE MANUALS**

A. When equipment is specified to be furnished as a system, whether a computer system or a system of electrical and mechanical equipment, the manual shall be provided in accordance with applicable requirements for operations and maintenance manuals.

B. Separate manuals for each operational system shall be provided.

C. Manuals shall include the following.

1. Servicing Schedule: A schedule of routine servicing and lubrication requirements shall be provided. A list of required lubricants shall be included.
2. Controls: A description of the sequence of operations and as-installed control diagrams shall be provided.
3. Valve Tags: Charts of valve tag numbers, with the location and function of each valve, shall be provided.
4. Circuit Directories: Complete circuit directories of panel boards shall be provided for electric and electronic systems.

## **1.06 INSTRUCTION OF VCMWD PERSONNEL**

A. Instruction of VCMWD personnel shall be provided when required by specific specification sections. Instruction shall include both classroom instruction and instruction at the various items of equipment. Whenever possible, the equipment shall be operated during the instruction and placed through a series of demonstration scenarios to demonstrate the capabilities and limitations of the equipment.

B. The location of the instruction shall be as defined in the specific specification section.

C. Instruction shall be scheduled at mutually agreed times. When the length of the instruction is specified as a certain number of days, the instructor shall be available to provide instruction and discuss the equipment with VCMWD personnel for a full 8 hours of each instruction day.

D. Data available from the manufacturer shall be used for instruction. Handout copies shall be provided.

## **PART 2 – PRODUCTS**

Not Used.

## **PART 3 – EXECUTION**

Not Used.

**END OF SECTION 01730**