

## SECTION 01 79 00

### DEMONSTRATION AND TRAINING

Revise this Section by deleting and inserting text to meet Project-specific requirements. Coordinate with the University Project Manager.

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

##### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for instructing University's personnel, including the following:
  - 1. Demonstration of operation of systems, subsystems, and equipment.
  - 2. Training in operation and maintenance of systems, subsystems, and equipment.

##### 1.3 INFORMATIONAL SUBMITTALS

- A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include outline for each training module.
- B. Qualification Data: For instructor, demonstrating qualifications and ability to instruct on maintenance and care of system, equipment and products.
- C. Schedule of Demonstration and Training: Prepare a schedule in tabular form of all demonstration and training required in individual Specification Sections including:
  - 1. Specification Section number and title.
  - 2. Description of required demonstration and training.
- D. Attendance Record: For each training module, submit list of participants and length of instruction time.

##### 1.4 QUALITY ASSURANCE

- A. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 01 40 00 "Quality Requirements," experienced in operation and maintenance procedures and training. Manufacturer's sales staff is not acceptable.
- B. Pre-instruction Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 "Project Management and Coordination." Review methods and procedures related to demonstration and training.

## PART 2 - PRODUCTS

### 2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.
- B. Training Modules: For each module, include instruction for the following as applicable to the system, equipment, or component:
  - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
    - a. System, subsystem, and equipment descriptions.
    - b. Performance and design criteria if Contractor is delegated design responsibility.
    - c. Operating standards.
    - d. Regulatory requirements.
    - e. Equipment function.
    - f. Operating characteristics.
    - g. Limiting conditions.
    - h. Performance curves.
  - 2. Documentation: Review the following items in detail:
    - a. Emergency manuals.
    - b. Operations manuals.
    - c. Maintenance manuals.
    - d. Project record documents.
    - e. Identification systems.
    - f. Warranties and bonds.
    - g. Maintenance service agreements and similar continuing commitments.
  - 3. Emergencies: Include the following, as applicable:
    - a. Instructions on meaning of warnings, trouble indications, and error messages.
    - b. Instructions on stopping.
    - c. Shutdown instructions for each type of emergency.
    - d. Operating instructions for conditions outside of normal operating limits.
    - e. Sequences for electric or electronic systems.
    - f. Special operating instructions and procedures.
    - g. A tour of the installation identifying the location of all system components.
  - 4. Operations: Include the following, as applicable:
    - a. Startup procedures.
    - b. Equipment or system break-in procedures.
    - c. Routine and normal operating instructions.
    - d. Regulation and control procedures.
    - e. Control sequences.
    - f. Safety procedures.
    - g. Instructions on stopping.
    - h. Normal shutdown instructions.
    - i. Operating procedures for emergencies.
    - j. Operating procedures for system, subsystem, or equipment failure.
    - k. Seasonal and weekend operating instructions.

- l. Required sequences for electric or electronic systems.
  - m. Special operating instructions and procedures.
  - n. Sequence of operation.
5. Adjustments: Include the following:
- a. Alignments.
  - b. Checking adjustments.
  - c. Noise and vibration adjustments.
  - d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
- a. Diagnostic instructions.
  - b. Test and inspection procedures.
7. Maintenance: Include the following:
- a. Inspection procedures.
  - b. Types of cleaning agents to be used and methods of cleaning.
  - c. List of cleaning agents and methods of cleaning detrimental to product.
  - d. Procedures for routine cleaning
  - e. Procedures for preventive maintenance.
  - f. Procedures for routine maintenance.
  - g. Instruction on use of special tools.
8. Repairs: Include the following:
- a. Diagnosis instructions.
  - b. Repair instructions.
  - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
  - d. Instructions for identifying parts and components.
  - e. Review of spare parts needed for operation and maintenance.
  - f. Product support/service model.
  - g. Purchasing of replacement parts.
9. Instruction specific to Instrumentation and Controls, Electrical Gateway, Network Lighting Controls, or any other new technology that is integrated with another system: Include the following:
- a. Overview and theory.
  - b. Wiring diagrams, including the one line diagram.
  - c. Creation, editing, and programming of the point database.
  - d. Integration topology and platform for communication.
  - e. Graphics packages and touch screens for the system.
  - f. Alarms and diagnostics.
  - g. Reporting functions dynamically and historically.
  - h. Remote access to the system.
  - i. Database back-up and maintenance.
  - j. Replacement and re-programming of replacement parts.
  - k. Point type and functionality for each type of point.
  - l. Programming.
  - m. Point/object editing.
  - n. Loop tuning.
  - o. Help files and other troubleshooting documentation.

- p. Instruction is given by the staff that setup the integration.
- C. Operation and Maintenance Manuals: Provide appropriate Operation and Maintenance manuals in each training session so that the detail drawings and maintenance activities are outlined and discussed for each application.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module.
- B. Set up instructional equipment at instruction location.

#### 3.2 INSTRUCTION

- A. Engage qualified instructors to instruct University's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
  - 1. University will furnish Contractor with names and positions of participants.
- B. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
  - 1. Coordinate schedule for all training with University Project Manager and provide the following:
    - a. Minimum 3 weeks notification.
    - b. Training matrix in calendar format.
    - c. Training outline for each session.
  - 2. Do not schedule training until equipment has been started up, commissioned, and is currently operating in its normal condition.
  - 3. Do not schedule overlapping training sessions.
  - 4. Schedule training sessions for a maximum of 4 hours per day; afternoons preferred.
  - 5. Provide separate training session on each system for operational/maintenance groups and user groups.
  - 6. Training sessions will be cancelled and rescheduled unless the following documentation is received:
    - a. Instruction qualifications.
    - b. Evidence that equipment has been started up, commissioned, and is currently operating in its normal condition.
    - c. Operation and Maintenance manuals.
- C. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.
- D. Travel, Room and Board: Coordinate any out-of-state training with the University Project Manager.
- E. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

3.3 DEMONSTRATION SCHEDULE

SECTION	TITLE	DESCRIPTION
08 42 29.33	SWINGING AUTOMATIC ENTRANCES	Engage a factory-authorized service representative to train University's maintenance personnel to adjust, operate, and maintain automatic entrances.
10 11 00	VISUAL DISPLAY SURFACES	Engage a factory-authorized service representative to train University's maintenance personnel to adjust, operate, and maintain motor-operated, sliding visual display units.
10 22 38	OPERABLE PANEL PARTITIONS	Engage a factory-authorized service representative to train University's maintenance personnel to adjust, operate, and maintain operable panel partitions.
10 55 00	POSTAL SPECIALTIES	Engage a factory-authorized service representative to train University's maintenance personnel to adjust, operate, and maintain postal specialties.
11 12 00	PARKING CONTROL EQUIPMENT	Engage a factory-authorized service representative to train University's maintenance personnel to adjust, operate, and maintain parking control equipment.
11 13 00	LOADING DOCK EQUIPMENT	Engage a factory-authorized service representative to train University's maintenance personnel to adjust, operate, and maintain loading dock equipment.
11 14 00	FOOD SERVICE EQUIPMENT	Engage a factory-authorized service representative to train University's maintenance personnel to adjust, operate, and maintain foodservice equipment.
11 82 26	FACILITY WASTE COMPACTORS	Engage a factory-authorized service representative to train University's maintenance personnel to adjust, operate, and maintain waste compactors according to manufacturer's requirements and ANSI Z245.2.
12 21 13	HORIZONTAL LOUVER BLINDS	Engage a factory-authorized service representative to train University's maintenance personnel to adjust, operate, and maintain systems.
12 24 13	ROLLER WINDOW SHADES	Engage a factory-authorized service representative to train University's maintenance personnel to adjust, operate, and maintain motor-operated roller shades.
13 20 00	SPECIAL PURPOSE ROOMS	Engage a factory-authorized service representative to train and provide training video to University's maintenance personnel to operate, adjust, maintain, and repair controlled environmental rooms and cold rooms.
14 21 00	ELECTRIC TRACTION ELEVATORS	Engage a factory-authorized service representative to train University's maintenance personnel to operate, adjust, and maintain elevator(s).

14 21 13	ELECTRIC TRACTION FREIGHT ELEVATORS	Engage a factory-authorized service representative to train University's maintenance personnel to operate, adjust, and maintain elevator(s).
14 24 00	HYDRAULIC ELEVATORS	Engage a factory-authorized service representative to train University's maintenance personnel to operate, adjust, and maintain elevator(s).
14 24 13	HYDRAULIC FREIGHT ELEVATORS	Engage a factory-authorized service representative to train University's maintenance personnel to operate, adjust, and maintain elevator(s).
23 00 00	HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)	Schedule instructional meetings for The University of Colorado Anschutz Medical Campus Facilities Operations maintenance personnel on the proper operation and maintenance of mechanical systems. Provide the project manager a minimum of 5 days notice prior to any testing.
23 05 13	MOTORS	Engage a factory-authorized representative to train the University's representative for 2 hours for each variable frequency drive installed. Training includes startup, shutdown, emergency operation, maintenance and servicing.
23 08 00	COMMISSIONING OF HVAC	Engage the commissioning authority to provide a customized one to two day training class for the university's engineering personnel in problem solving techniques including the review of mechanical system design as a whole, integrated unit, unique qualities of the installed mechanical system, insights into how to solve system-wide, multi-faceted problems, and identify a variety of resources to assist with problem solving.
23 09 00	INSTRUMENTATION AND CONTROLS	Engage a factory-authorized trained representative to conduct a minimum of 1-four hour on-site training course and an additional 1-four hour on-site training course per 25,000 sq. ft. for designated University personnel.
		Engage a factory-authorized trained representative to conduct an 8-hour seasonal loop training.
		Provide 40 hours of certified training in Instrument and Controls for every 100,000 sq. ft. of a lab/research building.
23 11 13	FACILITY FUEL-OIL PIPING	Engage a factory-authorized service representative to train University's maintenance personnel to adjust, operate, and maintain liquid-level gage systems, leak-detection and monitoring systems, and fuel-oil pumps.
23 21 23	PUMPS	Engage a factory-authorized service representative to train a University Representative for 2 hours of instruction for each pumping system provided.

23 25 13	CHEMICAL WATER TREATMENT	Engage a factory-authorized service representative to train operating personnel for 8 hours to familiarize them with all treatment equipment and procedures. Include procedure for taking weekly water test on open-loop systems and the application and safe handling of supplied chemicals.
23 64 16	CENTRIFUGAL WATER CHILLERS	Engage a factory-authorized service representative to train the University's representative for 4 hours including the operation of chillers, accessories and controls, procedures for startup and shutdown, troubleshooting, servicing, preventative maintenance, and review of the maintenance manuals.
23 65 00	COOLING TOWERS	Engage a factory-authorized service representative to train the University's personnel for one, 8-hour day, for operation and maintenance of the cooling towers.
23 76 00	EVAPORATIVE COOLING EQUIPMENT	Engage the manufacturer's representative to train the University's personnel for four (4) hours. Include start-up and shutdown procedures, troubleshooting procedures, and servicing and preventative maintenance schedules and procedures, and the contents of the Operating and Maintenance Data.
26 00 00	ELECTRICAL	Engage a factory-authorized service representative to train the University's Operations personnel a minimum of 8 hours for each system. Provide an additional minimum of 4 hours for any electrical gateway or networked lighting controls.
26 56 00	EXTERIOR LIGHTING	Engage a factory-authorized service representative to train University's maintenance personnel to adjust, operate, and maintain luminaire lowering devices.
28 31 00	FIRE DETECTION AND ALARM	Engage a factory-authorized service representative to train the University's Operations personnel a minimum of 8 hours for each system.
32 84 00	PLANTING IRRIGATION	Engage a factory-authorized service representative to train University's maintenance personnel to adjust, operate, and maintain automatic control valves and controllers.

**END OF SECTION 01 79 00**