

SECTION 01 79 00 - DEMONSTRATION AND TRAINING

1.01 SUMMARY:

- A. ^{A17}This Section includes administrative and procedural requirements for training Employer's Personnel on major lock complex components, such as lock (rolling) gates, lock operations and machinery control systems, and the filling and emptying system (culvert and conduit valves), as follows:^{A17}
 - 1. Demonstration of the operation of systems, subsystems, and equipment.
 - 2. Training on the installation, operation, and maintenance of systems, subsystems, and equipment.
 - 3. Demonstration and training CDs or DVDs.
- B. Related Sections include the following.
 - 1. ^{A16}Drawings and all Conditions of Contract apply to this Section for administrative requirements.^{A16}
 - 2. Sections in the Employer's Requirements that set out the procedural requirements for demonstration and/or training apply to this Section.
- C. ^{A17}The Contractor shall list the systems, subsystems, and equipment that will require demonstration and training, with the corresponding length of training time. Length of training time shall be measured by actual time spent performing demonstration and training in the required location. Time spent assembling educational materials, setting up, or cleaning up shall not be included.^{A17}
- D. The Employer shall have the right to assign craft and technical personnel to observe all the installation procedures for every system, from the start of the installation until the issuance of the Taking-Over Certificate. The Contractor shall allow these persons to observe all the installation procedures, tasks, and methods employed in the process. This is intended to allow the Employer's Personnel to acquire the training needed to obtain full knowledge of how the systems, equipment, or components were assembled and installed. The Contractor shall allow the assigned personnel to observe, take notes, shoot pictures and video, ask questions and request technical on-site information from the Contractor's Personnel involved in the installation process.
- E. Instructors shall provide demonstration and training either in English or Spanish, as previously agreed upon with the Employer's Representative.

1.02 REQUIREMENTS:

- A. **Program Structure:** ^{A17}The Contractor shall develop a training program that includes the required individual training modules for each system and for equipment that is not part of a system.^{A17} Training shall address, but not be limited to, the following.
 - 1. Lock (rolling) gates.
 - 2. ^{A16}Lock operations and machinery control.^{A16}

3. Filling and emptying system (culvert and conduit valves).
4. Motorized doors, including overhead coiling doors.
5. Equipment, including lift equipment.
6. Fire-protection systems, including fire alarms and fire-extinguishing systems.
7. Intrusion-detection systems.
8. Refrigeration systems, including chillers, pumps, and distribution piping.
9. Conveying systems, including elevators, lifts, and cranes.
10. HVAC systems, including air-handling equipment, air-distribution systems, and terminal equipment and devices.
11. HVAC instrumentation and controls.
12. Electrical service and distribution, including transformers, switchboard panels, battery systems, uninterruptible power supplies, and motor controls.
13. ^{A16} (Reserved). ^{A16}
14. Lighting equipment and controls.
15. Communications, control, and safety and security systems, including surveillance equipment.

B. **Training Modules:** The Contractor shall develop a learning objective and teaching outline for each module, with a description of the specific skills and knowledge the participant is expected to master. ^{A17}For each module, include training for the following. ^{A17}

1. **System Design, Operational Requirements, and Criteria:** This shall include the following.
 - a. System, subsystem, and equipment descriptions.
 - b. Performance and design criteria.
 - c. Operating standards.
 - d. Regulatory requirements.
 - e. Equipment function.
 - f. Operating characteristics.
 - g. ^{A16}Emergency procedures and repairs. ^{A16}
 - h. ^{A16}Routine maintenance. ^{A16}
 - i. Limiting conditions.

- j. Performance curves.
- 2. **Documentation:** The following items shall be reviewed in detail.
 - a. [Installation manuals.](#)
 - b. Emergency manuals.
 - c. Operational manuals.
 - d. Maintenance manuals.
 - e. Project record documents.
 - f. Identification systems.
 - g. Warranties and bonds.
 - h. Maintenance service agreements and similar continuing commitments.
- 3. **Operation:** The following shall be included as applicable.
 - a. Start-up 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. ^{A16}Year-round and around-the-clock operating instructions. ^{A16}
 - l. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.
- 4. **Emergencies:** The following shall be included as applicable.
 - a. Explanation of the 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.
5. **Adjustment:** The following shall be included.
- a. Alignments.
 - b. Adjustment checks.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
6. **Troubleshooting:** The following shall be included.
- a. Diagnostic instructions.
 - b. Test and inspection procedures.
7. **Maintenance:** The following shall be included.
- a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning, including a list of cleaning agents, procedures for routine cleaning, and warnings against methods of cleaning that may be detrimental to the product.
 - c. Procedures for preventive maintenance.
 - d. ^{A16}Procedures for predictive maintenance.
 - e. Procedures for corrective maintenance.
 - f. Emergency procedures and repairs. ^{A16}
 - g. ^{A17}Training on use of special tools. ^{A17}
8. **Repairs:** The following shall be included.
- a. Diagnosis instructions.
 - b. Repair instructions.
 - c. Disassembly; component removal, repair, replacement; and reassembly instructions.
 - d. Instructions for identifying parts and components.
 - e. Review of spare parts needed for operation and maintenance.

1.03 ^{A17}TRAINING:^{A17}

- A. **Facilitator:** ^{A17}The Contractor shall engage a qualified facilitator to prepare training programs and training modules, make arrangements for instructors, and coordinate with the Employer's Representative concerning the number of participants, training times, and location.^{A17} The Employer's Representative will furnish the Contractor with the names and positions of participants.
- B. ^{A17}The Contractor shall engage qualified instructors to train Employer's Personnel to adjust, operate, and maintain systems, subsystems, and equipment that are not part of a system.^{A17}
1. The Contractor shall furnish an instructor to describe the system design, operational requirements, criteria, and regulatory requirements.
 2. The Employer's Representative will furnish an instructor to describe the Employer's operational philosophy.
- C. **Video Recording:** Unless deemed unnecessary by the Employer's Representative, all demonstration and training shall be recorded.
1. The Contractor shall engage a qualified commercial cameraman to record the demonstration and training. The equipment shall be completely set up before the start of the class.
 2. Each training module shall be recorded separately, including classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
 3. The recordings shall be provided in high-quality and reproducible CD or DVD format.
 4. **Identification:** A label with the date of the recording, together with a short description, shall be affixed to each copy of the recordings provided.
- D. **Scheduling:** The final deadline and scheduling procedures shall be as follows.
1. The Contractor shall carry out and complete the training of Employer's Personnel in the installation, operation, and maintenance of the Works by the date that the Employer's Representative issues, and as a prior condition to the issuance of, the Taking-Over Certificate.
 2. ^{A17}Training shall be provided at mutually agreed upon times. For equipment that requires cyclic operation, the training shall be provided at the start of each cycle and within the cycle if necessary. Training shall be scheduled with the Employer's Representative at least 21 days in advance.^{A17}
- E. **Coordination:**
1. ^{A17}Training schedules shall be coordinated with the Employer's operations, adjusting schedules as required to minimize disruptions.^{A17}

2. ^{A17}Coordination with instructors shall include notification concerning dates, times, length of training time, and course content.^{A17}
 3. ^{A17}The content of training modules shall be coordinated with the content of approved emergency, operation, and maintenance manuals. The Contractor shall not submit any training program until operation and maintenance data required by Section 01 78 23 (*Operations Data*) has been reviewed and approved by the Employer’s Representative.^{A17}
- F. **Evaluation:** At the conclusion of each training module, each participant’s mastery of the module shall be assessed and documented by use of a written or practical performance-based test.
- G. **Cleanup:** Used and leftover educational materials shall be collected and removed from the Site or, if requested, turned over to the Employer’s Representative. Instructional equipment brought in for the training shall be removed, and the existing systems and equipment shall be restored to pre-training conditions.

1.04 SUBMITTALS:

- A. ^{A17}**Training Program:** The number of participants and of planning material copies shall be agreed upon with the Employer’s Representative prior to the initiation of the training. The Contractor shall submit the agreed-upon number of copies of the outline of the training program for demonstration and training to the Employer’s Representative 182 days before the Time for Completion. This program shall include a schedule of proposed dates, times, length of training time, instructors’ names for each training module, and the learning objective and outline for each training module.^{A17} At the completion of the training, the Contractor shall submit the agreed-upon number of complete training manuals (including the coordinated number of English and Spanish copies and the electronic version) to the Employer’s Representative for the Employer’s use.
- B. The Contractor shall submit qualification data for firms and persons engaged for the training to demonstrate their capabilities and experience, including lists of completed projects with project names and addresses and other pertinent information.
- C. **Attendance Record:** ^{A17}For each training module, a list of participants and the length of training time shall be submitted.^{A17}
- D. **Evaluations:** For each participant and for each training module, the results and documentation of performance-based testing shall be submitted.
- E. **Demonstration and Training Video Recordings:** At the end of each training module, 6 copies of the recording shall be submitted on CD or DVD.

1.05 QUALITY ASSURANCE:

- A. **Facilitator Qualifications:** The facilitator shall be a firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this project, and whose work has resulted in training or education with a record of successful learning.

- B. **Instructor Qualifications:** ^{A17}A factory-authorized service representative, complying with requirements in Section 01 40 00 (*Quality Requirements*) and experienced in operation and maintenance procedures and training shall be engaged for each training module.^{A17}
- C. **Photographer:** A professional photographer who is experienced in photographing construction projects shall be engaged to provide illustrations for training materials.
- D. ^{A17}**Pre-Training Conference:** A conference shall be conducted with the Employer's Representative at the Site.^{A17} The tasks to be addressed shall include, but not be limited to, the following.
1. ^{A17}Inspect and discuss locations and other facilities required for training.^{A17}
 2. ^{A17}Review and finalize training schedule and verify availability of educational materials, instructors, audiovisual equipment, and facilities in order to avoid delays.^{A17}
 3. ^{A17}Review content of training.^{A17}
 4. ^{A17}For training that must occur outside, review forecasted weather conditions and procedures to follow if conditions are unfavorable.^{A17}

END OF SECTION

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