



COMMISSIONING STANDARDS

Introduction

The purpose of this document is to provide an overview of the standards that should occur during the commissioning of a project(s). The commissioning process is to ensure that upon completion of a major or minor (where warranted) construction project, that buildings are designed, processes and systems are installed and functionally tested at optimal productivity and capable of being operated and maintained which will improve the likelihood that the equipment and/or systems will maintain their level of performance throughout its lifecycle according to the District's overall operational needs.

As we look at construction projects there are five (5) phases of development that will occur, with the fifth phase commissioning the construction project to the District's maintenance and operations team. From the first phase to the final phase the Design Team and District Staff of which consists of the Architect, and related design professionals, the District Team, the Superintendent, Assistant Superintendent, School Site/Department, Facilities, Construction or Program Manager and Maintenance and Operations Representative. This involvement assures the all stakeholders understand their roll in a successful construction project. Throughout the construction phase the architect, contractor, contractor's subcontractor(s) and the Construction Manager or Program Manager will work together to assure the final completion of the construction project. The remaining, the post acceptance involves the Design Team plus District Staff (which may include the District Maintenance and Operations Designee and/or others);

- Pre-Design/Planning Phase I (Design Team and District Staff)
- Design Phase II (Design Team and District Staff)
- Procurement Phase III (Design Team District and District Staff)
- Construction Phase IV (Design Team District and District Staff)
- Post Acceptance/Warranty Phase V (Design Team and District Staff)

It will be the responsibility of the Construction Manager (CM) to ensure that all warranty, operational manuals and warranty documents are transferred to the Maintenance and Operations or other Departments and that training is provided as defined by contract.

Brief Overview

In most if not all aspects of the project, the Project Team (design professionals, engineers, inspectors, contractors, sub-contractors) shall be led by a District representative. This representative will be the CM or PM. This individual is responsible to assure that each phase, from the Pre-Design/Planning Phase, Design Phase, Procurement Phase and Post Acceptance/Warranty Phase are based on unbiased performance without conflict of interest.

Pre-Design/Planning Phase

The pre-design/planning phase is the period which begins the commissioning process. The initial commissioning team is assembled at this time to lay the groundwork for the team effort and to plan the commissioning process. This phase will include the most important component of the early phase of a project; the development of the project documentation necessary for commissioning. This is considered the foundation of the commissioning process, and as the process moves forward the contents of this foundation will evolve over the course of the project.

Design Phase

During the design phase, the commissioning team must perform a design review, this ensures that the District's project requirements are clearly documented and followed. This phase of the commissioning process assures that the efficiency and operational concepts for overall development during the pre-design phase are completed. Finally, the design phase of the commission process also ensure that the next phase, the construction phase is adequately reflected in the bid documents.

Construction Phase

During construction phase of projects, the site(s) facility's systems (including architectural, structural, mechanical, electrical, and controls) are installed, undergo pre-functional performance tests, and then are placed into operation. Once the construction is completed, all the sites, facility's systems are to be operating as designed, both individually and collectively as a whole. In all cases the systems should be ready for functional and performance testing by the design team.

Post Acceptance/Training/Warranty Phase

At this point of the commission process the project is at a point of which all post acceptances will occur. This is where the project in some respect is considered complete and ready to commission (project turnover). The site/facility is now in the hands of the District, the operation department, or others. Though the project is complete and commission has occurred there still may be some commissioning tasks process that will continue throughout the predetermined warranty period.

Training

1. The Commissioning Team will review the proposed training material from the individual contractors.
2. The Commissioning Team will provide comments to supplement training material for operations and maintenance personnel, where appropriate.
3. The Commissioning Team will provide a coordinated training product through supervision.
4. The Commissioning Team will compile electronic copies of training material for the Owner's use and reference. Paper copies will be in 3-ring binders. Electronic copies will be on CD-ROM media, in a format that is searchable and printable, such as Adobe Portable Document Format (PDF).
5. The contractor for the respective system is responsible for the development and implementation of the training material for the system.
6. Training materials and M&O manuals must be submitted to and accepted by the Commissioning Team and accepted prior to commencement of any training.
7. Format for contractor-submitted training material:
 - a) Detailed agenda
 - b) Contractor contact sheet, including address, phone number, fax number and e-mail.
 - c) Detailed training material, divided by sections.
 - d) Maintenance checklists/ log sheets.
8. At the Owner's option, training may be videotaped for future reference and training.
9. All training sessions shall be scheduled and coordinated by the General Contractor through the Owner's Representative.
10. Training shall be completed and accepted by the owner prior to substantial completion and occupancy.
11. Supplemental training after building occupancy:
 - a) It is intended that one or two supplemental training sessions occur after building occupancy, primarily for the controls system, for the benefit of the M&O staff.

Minimum Allowances for Training Time EDIT

1. Unless Div. 1, Div. 15, or Div. 16 requirements are more strict, provide the following as a minimum:
2. Div. 15 – Mechanical:
 - a) Mechanical Systems, air side, water side, equipment: 40 hours
 - b) Temperature Controls: 40 hours
3. Div. 16 – Electrical:
 - a) Daylighting systems 8 hours
 - b) Electrical Systems, normal power, emergency power, lighting, equipment: 24 hours
 - c) Specialty – Fire Alarm: 24 hours

Responsibilities of Other Parties

1. A/E
 - a) Provide an introductory segment of Owner training to explain the Basis of Design, to familiarize the M &O staff with the design aspects of the building.
2. General Contractor
 - a) The GC shall be responsible for training coordination and scheduling and ultimately to ensure that training is completed.
3. Mechanical Contractor
 - a) Provide the Commissioning Team with a training plan two weeks before the planned training. Manuals must be approved by the Commissioning Team prior to commencing with training.
 - b) The training topics shall include all of the mechanical equipment and systems. The mechanical contractor shall provide training on each piece of equipment. Training syllabus shall include a breakdown of the time allotted for each system.
 - c) Provide designated Owner personnel with comprehensive orientation and training in the understanding of the systems and the operation and maintenance of each piece of HVAC equipment including, but not limited to, pumps, boilers, furnaces, chillers, heat rejection equipment, air conditioning units, air handling units, fans, terminal units, controls and water treatment systems, etc.
 - d) Training shall normally start with classroom sessions followed by hands-on training on each piece of equipment, which shall illustrate the various modes of operation, including startup, shutdown, fire/smoke alarm, power failure, etc.
 - e) Training topics shall include safe and proper operating requirements, preventative maintenance, special tools needed, recommended spare parts, common troubleshooting problems and solutions, and any equipment or system peculiarities. The training shall include start-up, operation in all modes possible, shut-down, seasonal changeover and any emergency procedures.

f) Hands-on training shall include start-up, operation in all modes possible, including manual, shut-down and any emergency procedures and preventative maintenance for all pieces of equipment.

4. Controls Contractor

a) The controls contractor shall have the following training responsibilities:

b) Provide the Commissioning Team with a training plan four weeks before the planned training. Manuals must be approved by the Commissioning Team prior to commencing with training.

c) There shall be three training sessions:

d) The first training shall convey the basic system layout and functionality, introduce the basic hardware items, software features, location of documents, special terms, etc. Upon completion, each student, using appropriate documentation, should be able to perform elementary operations and describe general physical layout of the system, and procedures for obtaining vendor assistance. This training session may be held on-site or off-site, as appropriate.

e) The second session shall consist of actual hands-on training. The session shall include specific instruction for operating the installed system, including any interface with other systems such as lighting and Fire Alarm. Software features shall be explained including security levels, alarms, system start-up and shutdown, power fails restart routines, changing set points, acknowledging alarms, overrides, manual operation of equipment, etc. Trainees shall set up and print out trends and reports using actual system data. Trainees shall set up a graphic display using actual system data.

f) The third training will be conducted on-site six months after occupancy and will be structured to address specific topics that trainees need to discuss and to answer questions concerning operation of the system.

Training Agendas

1. Prepared training agenda forms shall be partially filled out by the Commissioning Team and the owner and submitted to the relevant contractors. Contractors shall be instructed to complete certain sections and re-submit to the Commissioning Team for approval. Upon approval, the contractor may then provide copies of the approved training agenda to the trainers and trainees. The agenda shall be followed to assure efficient training and a knowledge level that meets or exceeds the owner's intent.

2. The trainer, prior to and during each training session, shall complete the prepared training record form. The trainer is responsible for checking the subjects covered from the training agenda and for obtaining signatures from the trainees in attendance.

To assure that all training and warranty conditions are obtained from the contractor, the CM or PM is to arrange training, warranty and hand-off process as defined. There will be a sign-off sheet to document this occurs.