

**Training Programs
for School Construction Projects
Best Practices Guidelines**

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1. Introduction

The purpose of these Best Practices Guidelines is to help districts plan for the important role training will play in the district's successful operation and maintenance of new or renovated school buildings.

New or renovated school buildings are built with sophisticated building systems that control the operation of thermal comfort of the building occupants, the air quality of the building, and the building's environmental impact/energy usage. Due to their complexity, these systems can provide operational and maintenance challenges for school building staff.

Districts can optimize their success in operating and maintaining the new school building systems by designing a training program that works best for them. The training program should consider all members of the school staff, from teachers, to kitchen personnel, to custodial and maintenance personnel. In some cases, it may be appropriate to include your district's outsourced service providers. The program should be designed to select and implement the type of training that is most beneficial to the staff being trained, and which may incorporate hands-on training and/or refresher sessions. The program should teach maintenance staff to recognize which sorts of issues they can fix themselves, and when to call on outside vendors. These issues and more are addressed in these Best Practices Guidelines.

These Best Practices Guidelines have been compiled from the experience of districts and their consultants who have worked in collaboration with the MSBA to design and build public school buildings. We appreciate the input of all, including the Massachusetts Facilities Administrators Association (MFAA) who have participated to provide these guidelines for use in ongoing or future projects. These guidelines do not address any additional challenges posed by the outbreak of communicable diseases such as the COVID-19 pandemic.

Getting Started

Per the MSBA's guidelines, starting at feasibility study, the School Building Committee includes a person(s) responsible for and familiar with the maintenance practices of the facility and the district. This person(s) assists the designer and the project team members to identify the needs of the user community including input on conversations such as building use and hours of operation, maintenance staffing and budget, and types and complexity of systems needed. During design development, the training programs will be developed as part of the Project Specifications. It is important for the right people from the district to continue to work with the Design Team to develop a training program that suits the district's current and future needs.

1.

A well developed training program should include the following:

- Identify the equipment and systems on which staff will be trained
- The manner and timeframe of the training in the form of a master training schedule
- Define blocks of training time (in hours) to be provided to district staff for each equipment and system/subsystem. Project specifications to clearly define preliminary (prior to startup) and post startup training for complex systems and minimum hours for each. Training sessions not to exceed three hours duration each
- The qualifications required of the trainers
- The staff to be trained
- Any prerequisites required for staff members to be trained
- Materials required in support of training
- Materials by which staff can offer future trainings to new members of the staff.

The district should give careful thought to who on the staff should participate both in the trainings themselves and who on the staff should assist in designing the training program. The district should assess the current experience, knowledge and skillsets of the facilities staff and consider what professional development may be needed prior to vendor training and building turnover to best prepare staff to receive training on the complex systems of the new building.

2. Equipment/Systems on which Staff will be Trained

The designer will develop a comprehensive list of equipment during Design Development, culminating in a final list by the time of the 90% Construction Documents submission. Common examples of equipment requiring training are roof top air handling units, makeup air units, lighting systems, and fire pumps to name a few. The designer will confirm responsibility for equipment training is clearly defined as the responsibility of the general contractor, subcontractor or equipment manufacturer in the project specifications.

In cooperation with the Commissioning Consultant, the project team will develop a list of systems for which training is required and the responsible party for providing each system's training. Examples of building systems include the Automatic Temperature Control Systems and the Building Management system. Working with the Designer and the Commissioning Consultant, the district will develop the program of training for all systems.

During Design Development/Construction Documents, the Designer will ensure that the following items are completed and incorporated into the construction documents at the time of bid:

- Develop project specific list of equipment on which training will be required
- The list is to include maintenance training required for finish materials including flooring, specialty wall finishes, counter surfaces, doors and windows
- Define all deliverables required for submittal and approval prior to conducting training: Training plan, training manual, Operations and Maintenance Manual, Trainer (instructor) resume.
- Identify the number of training sessions and hours/session to be developed for each major piece of equipment and each system in consultation with the Owner's Project Manager and Commissioning Consultant, and submit to district staff beginning at Design Development for review and approval.
- Develop the specification for Demonstration and Training (commonly Specification Section 01 79 00)
- Ensure that the Demonstration and Training specification section is cross referenced in the sections of major filed subcontractors: fire protection, plumbing, HVAC, electrical and all other necessary sections.
- Work with the Owner's Project Manager to ensure that an appropriate value is included in the Schedule of Values for each section where training is required for the Construction Manager/General Contractor to perform the work.

3. The Goals of the Training Plan and Schedule

In preparing to participate in and get the most benefit from the training program offered by the Construction Manager/General Contractor and its vendors, the district should:

- Ensure that it has had representatives from its facilities management staff participating as a member of the School Building Committee from the start of the feasibility study;
- Ensure that facilities management staff have participated in the relevant design decisions throughout the planning and design stages;
- Ensure that facilities management staff are involved in developing the training program and schedule;
- Ensure that the district has considered the current skill-set of its existing staff and provided professional development in preparation for the building training and turnover;

- Ensure that facilities staff familiarize themselves with the new systems and equipment that they will need to operate and maintain.
 - Suggest that staff attend walk-throughs of installation and pre-testing with the Owner's Project Manager and the Commissioning Consultant to familiarize themselves with the building throughout the construction phase.
 - Suggest that facilities staff attend commissioning meetings throughout the construction phase.
 - When appropriate encourage facilities staff to attend construction progress meetings

The goal of a well-planned training plan and schedule is to:

- Organize the training sessions into logical groupings of technical content to reflect different staff requirements:
 - Classroom Teachers: Basic lighting, temperature setpoints, phone, intercom IT, and operations
 - Administrative Staff: Same as classroom teachers plus basic troubleshooting and overrides, and contact information for emergencies
 - Custodial and Facility Managers: Detailed explanation of equipment and system operations, controls, troubleshooting and maintenance. Review the training manual and Operations and Maintenance Manual content
 - Custodial: Training on proper cleaning and maintenance of interior finishes per manufacturer's requirements. This training should be in concert with any necessary equipment training that custodian will use to maintain the building when cleaning for health.
- Ensure that all district staff to be trained have been provided with adequate time in their regular work schedules. This may require providing additional budget to cover shifts while they are being trained, or otherwise scheduling training sessions when staff is available.
- The specifications should include the qualification that instructors shall have not less than five years of providing instructional training with similar scope and complexity or other experience level deemed appropriate by the project team. Resumes of the proposed trainers should be submitted along with (no later than) the training manuals
- Specify some of the training to occur before building turnover and occupancy. Schedule it to occur early to avoid packing training sessions in a short window just prior to building occupancy.
- Provide for follow up training for specific systems (HVAC, BMS) following building occupancy. Suggest follow up training at 6 months after substantial completion to provide training in the opposite heating/cooling season from initial training.

- Consider establishing a set amount of follow-up visits by select equipment/system providers for issue resolution which also serves as training. This could consist of three individual days each for certain select systems, for example.
- Specify that training durations do not include travel time.
- Schedule training sessions on different topics on different days and in four-hour sessions to maximize maintenance staff availability and participation.
- Consider how the training can be scheduled to include staff who work second or third shifts, if needed.
- Schedule training Monday through Friday, except on holidays, with morning sessions and afternoon sessions. Morning session and afternoon session shall be split with a suggested 30-minute break between sessions.
- Schedule and repeat training for district staff for equipment and systems which operate differently on a seasonal basis (heating/cooling), in the opposite season from the initial training.
- Record trainings on video (as specified below) for the initial training as well as the opposite season training.
- Review and properly store the building documentation received (videos, Operations and Maintenance Manuals, as-builts) for long-term use by the facilities staff.

Responsibilities of the Construction Manager/General Contractor

Based on the requirements in the construction documents, the Construction Manager/General Contractor will provide a draft training schedule for review and approval by the district, Owner's Project Manager, and Commissioning Consultant. This schedule should include each equipment item and system specified which requires training and should be submitted 180 days following the Notice to Proceed. The schedule should indicate trainings which will be conducted prior to substantial completion and duplicate sessions conducted following substantial completion (typically 6 months following substantial completion). The draft training schedule is to be resubmitted as required until approved.

The Construction Manager/General Contractor should provide a sign-in sheet for each training session with the proposed attendee list to include name, phone number, and email address for each attendee. Attendees will sign or initial to document their attendance. At the end of each training day, the Construction Manager/General Contractor will email the district and Owner's Project Manager a scanned copy of the sign-in sheet for each session.

The final training schedule will be provided by the Construction Manager/General Contractor for review and approval; it is recommended that this be provided 180 days prior to expected substantial completion. The final training schedule is to be revised and resubmitted as required until approval is granted by the district, Owner's Project Manager, and Commissioning Consultant.

Responsibilities of the district

The district should designate one representative, who will attend each training session along with other district staff, and complete and sign a training evaluation form at the conclusion of each training session. The evaluation will document acceptance/non-acceptance of the training and if additional training is required on the topic.

The district will coordinate staff availability with the final training schedule.

The district should provide a planned attendee list to the Construction Manager/General Contractor and Commissioning Consultant for each scheduled training session no later than 10 business days prior to each session for example, or other timing deemed appropriate by the project team.

District should ensure that the Authorities Having Jurisdiction on the project are engaged beginning at Schematic Design. The project team should have a clear understanding of equipment and/or systems that the AHJ will be involved in, including final approvals for occupancy. The AHJ may be involved in regular testing on certain systems possibly the fire pump as an example. This should be noted during training for the systems.

4. Video recording of Training Sessions (Refer to Appendix for detailed requirements)

Following the completion of projects, the MSBA has received feedback from districts that the quality and consistency of the videos has not been satisfactory in all cases. To improve video consistency and quality, the following is recommended:

- Specify a professional video recording of each training session
- Specify a professional videographer experienced in digital photography be responsible for recording all training.
- Specify a standard format for the delivery and recording of each training.
- Specify that the videographer will coordinate his schedule with the Construction Manager/General Contractor's training schedule and will be required to be available for each training. Training will not proceed without the videographer present.
- The Construction Manager/General Contractor is to be assigned responsibility in the project specifications for all recording and delivery of six (6) copies of each recording to the district.

- Suggest a requirement that copies of the training videos will be provided to the district within 14 days of completion of each training or other deadline as determined appropriate by the project team.
- The district should review the videos upon receipt and prior to final payment to the Construction Manager/General Contractor to ensure quality.

5. Materials Required in Support of Training

- **Training Manuals:** Should be prepared and bound in format matching Operations and Maintenance Manuals and containing all the subject material to be addressed in the training sessions. Manuals shall be organized in the same manner as the training is presented including individual divider tabs marked for each logical grouping of subject matter. Organize material to provide sufficient space for attendees to take handwritten notes. Provide one copy for each attendee and provide six additional copies (or other quantity determined appropriate by the district) of the training manual for district's future use. Suggest that training manuals be provided at least 10 days prior to scheduled training dates. Consider also requiring Training Manuals to be provided in electronic form.
- **Approved Equipment/System Operations and Maintenance (O&M) Manuals:** In order for training to be scheduled the equipment Operations and Maintenance manuals must be in approved status.
- **Maintenance Software:** For projects which include new Computerized Maintenance Management System (CMMS) software, the Construction Manager/General Contractor is to pre-load maintenance software with all required equipment information. Construction Manager/General Contractor will then work with the district Facilities Director to prepare the Year 1 district maintenance schedule for all equipment and systems. Training will be provided to district staff on all aspects of the CMMS: how to enter data, and how to generate and close work orders for required maintenance. For projects where the district will re-use their existing CMMS, the Construction Manager/General Contractor will provide all required equipment information to district staff for their input.
- **Districts should acknowledge that training is an on-going process needed to address staff turnover, control software upgrades, and equipment changes.** Staff must be provided the tools they need for training following project closeout. Critical items for this task include training manuals, Operations and Maintenance Manuals (approved, not draft), videos and record plans. Districts should provide continual professional development opportunities for staff that are operating the building systems. Either through manufacturer offered training opportunities or third party educational institutions specialized in building operations continuing education.

Training Closeout

Prior to release of final payment to the Construction Manager/General Contractor, the Owner's Project Manager will coordinate a meeting with the District Facility Director, Construction Manager/General Contractor, and Commissioning Consultant to review the status of all scheduled training and deliverables including record plans for each system. A schedule will be established for any training which remains to be completed or must be repeated and for any incomplete deliverables. All training (including repeated training) and deliverables must be satisfactorily completed prior to final payment and contractor closeout.

Appendix

Training Video Requirements: Construction Manager/General Contractor agree that the terms of their agreement with each subcontractor permit full recording by the district of all training sessions and subsequent unfettered use of the recordings by the district. Acknowledgement of district right to video record all trainings is to be addressed in the project specifications.

- General:
 - Prior to the start of each training, confirm the area selected is suitable for instruction in terms of adequate space and lighting.
 - Prior to the start of each training module, suggest recording each chart/slide containing learning objective and lesson outline. This will be the opening of each video and will assist future users of the video to understand the content they are about to view.

- Video: Provide minimum 720 X 480 (480p) video resolution converted to mp4 format file type acceptable to district, on electronic media.
 - Electronic Media: Read-only format DVD-ROM disc acceptable to District, with commercial grade graphic label.
 - File Hierarchy: Organize folder structure and file locations according to project manual table of contents. Provide complete screen-based menu.
 - File Names: Utilize file names based upon name of equipment generally described in video segment, as identified in the Project Specifications.
 - Construction Manager and Trade Contractor File: Using appropriate software, create a file for inclusion on the Equipment Demonstration and Training DVD that describes the following for each Contractor involved on the Project, arranged according to the Project Table of Contents:
 - Name of Construction Manager/General Contractor and Trade Contractor
 - Business Address
 - Business telephone number
 - Point of Contact, name and position
 - Email address

- Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.

- Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording. Furnish additional portable lighting if required.