Commissioning of Fire Protection and Life Safety Systems

Presented by:
Charles Kilfoil
Bechtel National
Waste Treatment Plant
Richland WA

Fire Protection Engineering's role in sustainability through Commissioning

Fire Protection and Life Safety Systems are recognized as part of whole building systems.

Sustainability is advanced through Commissioning as it pertains to Fire Protection and Life Safety Systems.

Active and Passive Systems are included in this scope.

What is Commissioning?

- **Commissioning (Cx).**
  - A systematic process that provides documented confirmation that specific and interconnected fire and life safety systems function according to the intended design criteria set forth in the project documents and satisfy the owner's operational needs, including compliance requirements of any applicable laws, regulations, codes, and standards requiring fire and life safety systems.
  - Commissioning is initiated in the design phase by documenting the design intent and continues throughout construction, acceptance, and the occupancy period.
  - Fundamental to Commissioning is Integrated Testing.

What is Commissioning?

- Commissioning does not modify or supplant existing standard requirements for testing, rather its intended to complement these requirements by stressing integrated testing to ensure reliable functionality .

- NFPA 72 National Fire Alarm and Signaling Code -SIG-TMS forms and requirements.
- NFPA 25 ITM Water-Based Fire Protection Systems - forms and requirements.
- Other NFPA Extinguishing System Standards - forms and requirements.
- HVAC
- Building Management

What is Integrated Testing?

- An assessment of fire protection and life safety systems function and operation using direct observation or other monitoring methods to verify the correct interaction and coordination of multiple integrated systems in conformance with the fire protection and life safety objectives.

Integrated Systems

- Commissioning applies to the functions of integrated systems, provided for fire protection or life safety, in the design phase, construction phase and occupancy phase of the commissioning process.

Owner's Project Requirements (OPR)

- The OPR should form the basis from which all design, construction, acceptance and operational decisions are made.
- The OPR should be developed with input from the Owner and all key facility users and operators.
- The development of the OPR begins with appointment of a Cx Team.

Cx Team

(1) Owner
(2) Commissioning Authority
(3) Fire Commissioning Agent (FCxA)
(4) Installation Contractor(s)
(5) Manufacturer's Representatives
(6) Registered Design Professional(s)
(7) Construction Manager/General Contractor
(8) Owner's Technical Support Personnel
(9) Facility Manager or Operations Personnel
(10) Insurance Representative
(11) AHJ

The Cx Team develops the OPR and initiate the Commissioning Process.

Key Cx Team Roles

- Certain Cx team roles are important to successful Commissioning.
- Fire Commissioning Agent (FCxA)
- Registered Design Professional
- Installation Contractor

Fire Commissioning Agent (FCxA)

The FCxA represents the Owners interests and is responsible for the following:

(1) Organize and lead the Cx Team,
(2) Coordinate Cx Team meetings,
(3) Facilitate the development of the OPR,
(4) Verify Cx Process scope of work,
(5) Integrate Cx into project schedule,
(6) Prepare the Cx Plan,
(7) Prepare Cx Process specs,
(8) Execute the Cx Process,
(9) Review the plans and specs,
(10) Attend pre-bid meeting,
(11) Approve Systems Manual,
(12) Track and document issues,
(13) Prepare Cx Progress Reports,
(14) Witness system testing,
(15) Review installation docs,
(16) Recommend acceptance,
(17) Track compliance with matrix.

Registered Design Professional

(1) Participate and assist in the development of the OPR.
(2) Document the Basis of Design. (BOD)
(3) Prepare Contract Documents.
(4) Respond to the Commissioning Team design submission review comments.
(5) Specify operation and maintenance of systems in the project specifications.
(6) Review and incorporate the Commissioning Teams comments, as appropriate.
(7) Review test procedures submitted by the installation contractor.
(8) Review and comment on the Commissioning Process Progress Reports and Issues Log reports.
(9) Review and accept record documents as required by the Contract Documents.
(10) Review and comment on the final Commissioning Record.
(11) Recommend final acceptance of the systems to the Owner.

Installation Contractor

(1) Include all Commissioning Process requirements and activities in the scope of services.
(2) Attend required Commissioning Team meetings.
(3) Include Commissioning Process milestones in the project schedule.
(4) Implement the training program as required by the Contract Documents.
(5) Provide submittals to the RDP, Owner and Commissioning Team.
(6) Develop individual system test plan, including acceptance and integrated testing.
(7) Notify the General Contractor and FCxA when systems are ready for testing.
(8) Demonstrate the performance of the systems, including integration.
(9) Complete the Construction Checklists as the work is accomplished.
(10) Continuously maintain the Record Drawings as required by the Construction Documents.

The Process

Phases:

Pre-Design Phase.

Design Phase.

Construction Phase.

Occupancy Phase.

Pre-Design Phase

During the pre-design phase of the project, the Commissioning Team should:

(1) Develop the OPR.
(2) Select the FCxA.
(3) Identify the Commissioning scope.
(4) Develop the preliminary Commissioning Plan.
(5) Review the Pre-Design documents.
(6) Develop regulatory code analysis.
(7) Initiate the commissioning plan.

Design Phase

The commissioning team should:

(1) Document the scope for commissioning activities.

(2) Document the Cx Procedures and create a Cx Activities Schedule.

(3) Verify that the construction documents comply with the BOD.

(4) Identify qualified specialists and their responsibilities.

(5) Coordinate and document Cx Team Meetings and progress reports.

(6) Document issues and changes and update the Cx Plan.

(7) Create construction checklists.

(8) Create required project testing requirements. (include check lists requiring when AHJ's and Cx Team members are to be present during acceptance testing)

(9) Develop project training requirements

Construction Phase

The Fire Commissioning Team should:

(1) Confirm that the commissioning schedule is still valid.
(2) Verify submittals are in conformance with the BOD.
(3) Verify materials, construction and installation comply with the BOD.
(4) Confirm qualified specialists are performing Cx activities per plan.
(5) Coordinate and document Cx team meetings and progress reports.
(6) Document any issues and changes to the project and update the plan.
(7) Perform Cx (QC) construction inspections with plan checklists.
(8) Perform required observation procedures or cause them to be performed by the responsible party.
(9) Record and adjust for any revisions and/or changes to plan documents.
(10) Verify and document testing performed in the Construction Phase.

Occupancy Phase

The minimum requirements for occupancy phase should include but not be limited to:

(1) Acceptance testing and inspection completion and documentation.

(2) Conduct testing for modifications made during the construction phase.

(3) Delivery of system manual, operation and maintenance manuals, and vendor emergency contact list.

(4) Training on the use and operation of the systems.

(5) Record set drawings and documents.

(6) Test and inspection records for the systems.

(7) A digital copy of site specific software for systems that is current with the installed system.

(8) Warranties for the systems and equipment.

(9) Recommended preventative maintenance program for systems.

(10) A list of required ITM for fire protection and life safety systems.

Passive Systems

Commissioning plans should also identify the requirements for passive fire protection systems including:

(1) Fire and Smoke Dampers

(2) Fire and Smoke Doors

(3) Through Penetration Fire Stops

Re-Cx, and RCx

Commissioning Plans should also address Re-commissioning (Re-Cx) and Retro-commissioning (RCx) requirements of active and passive fire protection and life safety systems where installed in existing structures.

Periodic Integrated Testing

Periodic integrated testing (PIT) should verify correct operation of fire protection and life safety systems in accordance with the established design criteria, BOD, OPR, equipment performance requirements or applicable codes and standards.

Periodic Integrated Testing

Fire protection and life safety systems that have been commissioned upon installation in accordance with the Commissioning Process should have periodic integrated testing performed at intervals according to the commissioning plan.

Other PIT Rules

Integrated systems in structures that have not been commissioned in accordance with the Commissioning Process, should have Integrated Testing performed as follows:

(1) Where new component fire protection and life safety systems are installed and interconnected to existing fire protection and life safety systems.

(2) Where existing fire protection and life safety systems are modified to become component, interconnected systems.

(3) Where the interconnections or sequence of operations of existing integrated fire protection and life safety systems are modified.

Phased sequencing of periodic integrated testing should be permitted subject to the approval of the AHJ.

Forms

- Commissioning documents and forms should be used to record commissioning and integrated testing of fire and life safety systems.
- Basis of Design documents referenced in installation standards should be utilized.
- Testing and inspection documents referenced in installation standards should be utilized for individual system testing.

Forms

Where required by the AHJ, jurisdictional forms should be incorporated.

Where no form or checklist exists, the Registered Design Professional should be responsible for developing a form or checklist.

The Authority Having Jurisdiction should approve all forms.

Cx Questions?

Thanks.