

17th NATIONAL CONFERENCE ON BUILDING COMMISSIONING



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Who's in Charge Anyway? Managing Roles & Responsibilities in the Cx Process

Construction Inspectors and the CxA: Roles, Responsibilities and Teamwork

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Learning Objectives

1. Clarify the roles between the construction inspectors/Observers (Building Department Inspectors, Fire Marshals, Design Professionals, Inspectors of Record) and the Commissioning Authority.
2. Delineate the responsibilities of each focusing on where overlap typically occurs and how to ensure all aspects of the construction review are covered.
3. How to build teamwork and cooperation to maximize value to the owner and help to ensure a successful project.

Welcome!

- Generally accepted as the first building code:
 - 229. If a builder builds a house for someone, and does not construct it properly, and the house which he built falls in and kills its owner, then that builder shall be put to death*

*Code of Hammurabi

Introduction

- Critical aspects of the construction inspection and commissioning process are to verify that the building :
 - Has been constructed per the contract documents
 - Meets applicable building codes and standards
 - Meets the owners Functional Requirements

Introduction

- Historically, the following have fulfilled these requirements:
 - Building Department Inspectors
 - Inspector of Record (IOR)
 - Fire Marshal
 - Design Professional
 - Owner's Representative

Introduction

- With the increased complexity of building systems, the need to verify correct operation and functionality has become more important
- Many facets of this need are addressed through proper application of the commissioning process
- However..... there is sometimes confusion on who is responsible for verifying what

Introduction

- Many in the construction and inspection industry do not understand the commissioning process
- This has lead to a lack of clarity ranging from not understanding the need for a CxA to a belief that the CxA was responsible for inspecting everything
- There is a happy medium!

Introduction

- The term “constructed properly” has many facets and among these are:
 - Meeting code compliance requirements
 - Meeting acceptable standards,
 - Using best industry practices
 - Installed per the contract documents
 - Meeting the owner’s functional needs
 - Constructed with high quality craftsmanship

Before We Begin!

- It is important to keep in mind that the division of work between various Authorities Having Jurisdiction (AHJ's) may differ from area to area
- For example:
 - Fire Marshal's office in Portland might be responsible for witnessing the acceptance testing of a smoke control system while in Salem that responsibility might fall under the Building Department
- We are talking in generalities here!

Before We Begin!

- Within a given jurisdiction you might see overlap concerning the inspection of specific systems or parts of systems. For Example:
 - In one city you might have a mechanical inspector witnessing the operation of smoke/fire dampers and the smoke detectors (or other devices that trigger their operation) while the fire inspector is only interested in seeing that the detectors themselves operate.
- Again, we are talking in generalities here!

Before We Begin!

- May see a requirement for a third party acceptance of the overall smoke control system for a building.
- Again, the requirements, roles and responsibilities may change from region to region
- Depending on the CxA's scope of work – it may be important to understand the process in the area where construction is taking place

Building Inspector

- The primary role of building inspectors is to represent the local Jurisdiction Having Authority (JHA) and verify code compliance both on the plan check phase as well during construction.
- The primary purpose is to ensure the health and safety of occupants.

Building Inspector

- Most building codes are based on the International Code Council (ICC),
- Many localities have additional ordinances and codes that modify or add to the national model codes.

Building Inspector

- In most jurisdictions, it is necessary to obtain a building permit prior to the construction or major renovation of any building
- Permits are generally issued by the Chief Building Official (or one of his/her charges) after a plan review and the payment of a plan-check and permit fee

Building Inspector

- There are many types of inspectors:
 - Building Inspectors inspect the structural quality and general safety of buildings
 - Electrical Inspectors examine the installation of electrical systems
 - Mechanical Inspectors inspect the installation of the mechanical components
- One inspector may cover multiple areas.

Building Inspector

- Process
 - Plan Review
 - Receives job inspection card posted at the site
 - Contractor contacts permitting agency for inspection during construction process
 - Contractor completes work
 - Each trade is inspected for approval separately (electrical, mechanical, elevators, etc.)
 - Final Approval is then obtained

Fire Marshall

- Fire Marshall is typically responsible for:
 - Approving Test Procedures for fire sprinkler, fire alarm and smoke control system
 - Verifying proper installation and operation of fire and life safety equipment and systems
 - Approving third party testing agency's report
 - Issuing Certificate of Occupancy or Certificate of Completion

Fire Marshall

- Life Safety Systems Typically include
 - Fire Sprinkler
 - Fire Alarm
 - Detection
 - Notification
 - Control Functions (Doors, HVAC, Smoke Control)
 - Smoke Control
 - Function (3rd Party test report)
 - Interface with Fire Alarm
 - Clean Agent
 - Chemical Suppression

Fire Marshall

- Example of typical tests:
 - Automatic Detectors
 - Detectors are installed as shown on plans
 - Addressable smoke detectors correctly identify type of device and protection area
 - Conventional smoke detectors correctly identify protection zone
 - Heat detectors were tested-fixed temperature, non-destructive
 - Other detectors tested satisfactory – fire wire, beam detectors, VESDA
 - Smoke Detectors not located within 3' of supply or return HVAC vent
 - In general, verifying compliance with NFPA 72, the National Fire Alarm Code.

Fire Marshall

- Process for Fire and Life Safety Systems
 - Plan Review (IFC and NFPA Standards)
 - Permit Issued
 - Testing Process Review
 - Installation Inspections
 - Functional Testing of Systems
 - Issue Certificate of Occupancy or Completion

Inspector of Record

- Act as a representative of the AHJ in special areas.
 - In California for Colleges and Universities
 - Projects under the Division of the State Architect
- Often-times used in place of a local building inspector

Inspector of Record

Responsibilities:

- The inspector must maintain approved (e.g. Department of the State Architect stamped and initialed) construction documents at the job-site in an organized, readily accessible manner.
 - The inspector must study and fully comprehend the requirements of the construction documents in order to provide competent inspection of the work.
 - Continuous inspection means complete and timely inspection of every part of the work

Inspector of Record

- Responsibilities (cont.)
 - The inspector must maintain detailed records of all inspections
 - Provide specific code-prescribed notices and reports to the responsible design professional, DSA, Owner and the contractor
 - Provide other notices and reports as required by the project

Design Professional

- Process
 - Produce Construction Drawings and Specifications
 - Provide clarification through RFI's
 - Approve changes in the design
 - Periodically attend construction meetings
 - Periodically evaluate construction for conformance with design intent

Design Professional

- Responsibilities:
 - Develop drawings and specifications such that building is code compliant
 - Ensure design meets client's needs and functional requirements
 - Ensure design meets budget requirements
 - Provide assistance during construction regarding design issues

Commissioning Authority

- The CxA is responsible for the following activities:
 - Review the Owner's Project Requirements (OPR) and Basis of Design (BOD) Documents.
 - Develop and communicate Cx Plan
 - Provide installation verification forms and functional performance test (FPT) procedures
 - Provide design reviews
 - Review the contractor's plan for placing systems into operation and preparing them for functional testing,

Commissioning Authority

- Review equipment submittals
- Review the contractor's completed Systems Readiness & Startup documentation
- Witness (selectively) startup of equipment
- Document commissioning issues in the Issues Log
- Review the TAB record sheets.
- Verify equipment installed per project requirements
- Functionally test (typically) energy consuming systems

Commissioning Authority

- Develop Cx Record and Systems Manual
- Verify training
- Review O&M
- Make recommendations to the owner regarding acceptance of the FPT results and acceptance of the contractor's commissioning work
- Perform opposite season testing and end-of-warranty review

So What's The Problem?

- Multiple inspection procedures on the same systems may result in different outcomes
- Misunderstanding of the role of the CxA may lead to unfounded concerns of other inspector's
- Most every project is unique, with varying roles and responsibilities regarding inspections

So What's The Problem?

- Typical areas of uncertainty:
 - Fire Alarm/Smoke/Fire Control system:
 - Fire Smoke Damper installation and operation
 - AHU-Fire alarm system integration
 - Pressure Control
 - Structural
 - Seismic Bracing
 - Equipment supports
 - Waterproofing
 - Trench work

So What's The Problem?

- Typical areas of uncertainty:
 - Electrical:
 - Power distribution
 - Load testing
 - Back-up Generator/ATS
 - Code Compliance
 - Mechanical
 - Capacity Testing
 - Code Compliance

So What's The Problem?

- Problems may arise if:
 - A Component or system is not tested or observed
 - “I thought they were responsible for that”
 - Overlap of inspections/testing
 - Can be costly, or different results reported
 - Fear of impinging on ones livelihood
 - Conflicting or too numerous Punch/Issues Lists
 - Personnel with limited experience used to observe/inspect work
 - Differing backgrounds mean some inspectors focus on areas they are most familiar

So What's The Problem?

- Benefits of Multiple Observers/Inspectors
 - Each Inspector/Observer an expert in their area
 - Sometimes, if a good relationship exists, one can cover for the other
 - Multiple “eyes” reviewing the same work; each from a different perspective
 - Varying level of experience – not all those who are responsible are the most qualified; additional “eyes” can help alleviate this issue
 - Can reduce costs if properly coordinated
- ***We are all working towards the same goal!!***

Clarification of Roles – Typical Project

- **Inspector/IOR vs. CxA**
 - Inspectors responsible for Code Compliance and installation per Contract Documents
 - CxA also responsible for installation per Contract Documents
 - More emphasis on OPR/design intent
 - Less emphasis on code compliance
 - CxA may observe and report on non-compliant code issues
 - CxA responsible for verifying operation meets owner's functional requirements
 - CxA more focused on QA process

Clarification of Roles – Examples

- Electrical inspector vs. CxA
 - Inspector verifies lighting controls installed per code
 - CxA verifies Lighting system properly controlled per OPR
- Fire Marshal vs. CxA
 - Fire Marshal tests nearly all aspects of the life safety systems
 - CxA will likely focus on interaction between Fire Alarm and HVAC system
 - Verify access to fire dampers for maintainability
 - Witness shutdown of AHU based on output signal from Fire alarm system

Clarification of Roles – Examples

- Mechanical Inspector vs. CxA
 - Inspector verifies fuel piping, combustion air openings, vent systems, bracing, etc. installed per code
 - CxA verifies HVAC systems installed and operate to meet owners functional requirements as documented in the OPR, BOD, CDs and submittals
 - In addition, CxA verifies, O&M manuals, training, warranties, etc. properly executed which are typically outside inspector's scope

Potential Solutions

- Communicate:
 - Call for coordination meetings
 - Educate them on the role of the CxA
 - Communicate that the CxA is another set of eyes and is focusing on aspects typically not covered in the Cx process
 - Create a matrix of systems and whose responsibility it is to verify installation/functionality
 - Focus to ensure important actions don't "fall through the cracks"

Potential Solutions

- Learn from them by observing their work
- Work with them – may help and cover if you are not able to observe work or a test
- Help each other by communicating observed issues not necessarily in your scope

Panel Discussion

Q&A

AIA Quality Assurance



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THANK YOU!!

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